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THE VACCINATION QUESTION.

AN ESSAY TOWARDS DETERMINING THE BOUNDARIES WITHIN
WHICH A SCIENTIFIC THEORY MAY RIGHTFULLY CLAIM
TO HAVE EFFECT GIVEN TO IT BY LEGISLATION.

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PREFATORY NOTICE.

APPEARANCES point to the conclusion that Compulsory Vaccination, now on its trial, will be decided, for or against, in this country, sooner than elsewhere, because the discussion of it is being carried on here alone on a large scale. This is not the case as yet, either in France, Germany, or America. The compulsion is, indeed, settled here for the time, so far as a penal law can settle it; but settlement after discussion implies national acquiescence, while settlement before discussion does not.

The controversy on both sides, the personal opposition in many cases to compulsory vaccination, wax so warm; fines and jail for conscience' sake are such historical fuel to English people, that we may fairly say that the subject of the following essay is now becoming a "burning question."

In introducing Dr. Siljeström to the English reader, it has been thought that his dispassionate tone, betokening a scientific mind, and a cold state of public opinion in Sweden, will help the com-

batants here to review their respective positions with clearer heads. And that the case being in these pages wholly removed 'to a foreign country, may enable the two parties to see their game with a little of the advantage which onlookers sometimes have over players.

One more help may accrue from Dr. Siljeström's work. The official statistics of Sweden are occasionally alluded to by our writers on vaccination, as of considerable interest ; but these statistics are not hitherto easily accessible in England. They are reproduced in this essay, and constitute the foundation of its argument. Independently of which they also now offer themselves as a fresh set of attestations demanding the study of both parties to the question.

For the better comprehension of the statements in the essay, some of the provisions of the Swedish Vaccination Law are subjoined :

1. Every child must be vaccinated before it is two years old.

2. A certain period after vaccination is fixed for ascertaining the result of the operation. Presentation for inspection is likewise obligatory.

3. Any one found guilty of contravening the provisions of the law is punished with fines of from one and a-half to five crowns,* (during an actual epidemic, of not less than five crowns,) and in default of payment, with imprisonment.

* A Swedish crown is a fraction more than an English shilling.

4. Every vaccinated person is bound, under a penalty of five crowns, to allow vaccine matter to be taken from him should it be required by the vaccinator.

5. No one can be admitted into a public school or other educational institution without a certificate of having been vaccinated, or of having had the natural small-pox, or, that having been vaccinated five years previously, at the longest, no results were obtained.

6. Indigent children are vaccinated at the expense of the commune.

7. The communal authorities are entrusted with carrying out the law, but may, in case of urgency, call in the aid of the Crown officials.

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ALTHOUGH the greater part of this treatise will be occupied with an examination of the value and importance of vaccination as a means of arresting small-pox, this is not the principal question with which the author proposes to deal. He does not belong to the medical profession, and his investigations will, therefore, only touch cursorily, or almost negatively, on the vexed and purely medical side of the question, which is at present raising so much discussion. He will in a great measure limit himself (as he has intimated in the title page) to endeavouring, with the aid of such statistics as he has been able to collect, to contribute to the solution of the general problem as to how far science can and may rightfully claim to make itself a power in legislation; a question which is not unimportant either from the scientific or the political point of view, and on which the example chosen by the author, seems to him to throw very valuable light.

Thanks to the good sources from which he has drawn, and for which he is indebted to the courtesy of the Statistical Department, he may, however, be in a position at the same time to communicate matters of some interest regarding the special question also.

As a rule it is impossible to overstate the importance of scientific research to the commonwealth. It is not only the new truths which are gradually brought to light, and the influence of these on progress in all directions; more important still, if possible, than the results of the inquiry, is the inquiry itself *as such*, because of the *love of truth*, and the *conception of the nature of truth*, and of the *correct means of discovering it*, which widely-spread scientific research alone can develop and maintain in a nation; the significance of this lying herein, that, after all, there is no more secure foundation for moral development—which is the highest end of society—than *truth* in theory and in practice. But if the discovery of truth be of such great value to the community, then nothing can be more natural or more desirable than that legislation should gradually appropriate the fruits of science, and draw therefrom all possible use for its ends.

It is, however, of the utmost importance as regards this matter, if good and useful objects are to be obtained, that the scientific results on which legislation is to build be *real truths*; for in the contrary case, viz., if they be merely founded on mistaken, or unproved hypotheses, the legislation which takes them

for its guide can only lead to mischief and discontent ; while, on the other hand, the science which is thus used, must of necessity fall into disrepute.

And if it should happen that legislation adopted a falsehood, or a mere arbitrary dictum, the gift of a false science, for the starting point of its measures (of which examples have not been wanting in barbarous times), and thus proved itself to be little else than tyranny, the most mischievous results would not fail to ensue. This leads us to the more general conclusion, that where there is not a basis of fully and well tested truth, there legislation ought to proceed with the utmost caution, and rather interfere too little than too much, more particularly when there is a question of imposing penalties for certain acts or omissions contrary to law.

That which has been said above is, for instance, strictly applicable within the ecclesiastical domain. It is necessary, however, that we should look at the subject from the proper point of view. If, when judging of those persecutions which have taken place in one church or another for the purpose of giving legal protection to orthodox opinions, we start from the point of view, that these opinions express absolute truth, then we cannot in fact have much to say even against the greatest cruelties which are recorded in the history of the church.

If it be allowed that the heretics were irrecoverably condemned ; were in fact only evil spirits appearing in this world (and as such they were in a great

measure considered); that, consequently, they ought to be hated and avoided as most dangerous to their fellow-men, who might be led by them into the same condemnation; and that thus these persons were also in the highest degree dangerous to the community, then nothing was more reasonable than that they should be got rid of with all despatch; and that even the greatest cruelties should be considered allowable if they could serve to restrain others from incurring the same fate which awaited these unfortunate victims, the more so as every earthly torture could be but an insignificant trifle when compared with the sufferings which were supposed to await them in eternity. The mistake was evidently not so much in the conclusion as in the premises—namely, the considering as given and determined truth that which was, at most, merely the opinion of a certain party, though eventually, this party might embrace a whole nation. Strangely enough, or, perhaps, naturally enough, the very science whose propositions are the least verifiable, in the strict sense of the term, and which appear, in consequence, in the form of dogma and creeds, is the very one which has conspicuously solicited the assistance of legislation to uphold the truth of its tenets by the help of penalties. Happily, in regard to these matters, new views have been adopted, and the law now allows every individual to form his own creed according to his convictions, on those deep subjects which cannot be the objects of strict proof; and there are few

things which have exercised so beneficent an influence on the welfare of society, and on the mental development of the individual, as that religious freedom which is the outgrowth and fruit of this change of views.

As regards the other sciences, it has probably never entered the mind of any one to enforce, by legislative measures and penalties, the authority of their doctrines as such. It is true that Galileo suffered for his belief in the Copernican system, or for his opposition to the prevalent dogmas of natural science ; but this was because the doctrines in question were considered as being part of the theological system. Since this point was given up, it has been, and still is, allowed to every one to believe, either that the earth stands still or that it goes round, and it has never been deemed proper to determine by law whether we ought to adopt the doctrine of one or two electric fluids, of the undulatory theory, or of the emanation theory of light, &c., or one given author's presentation of history, instead of another's, or any particular theory as to agriculture, commerce, &c.

It is only when scientific doctrines have assumed great *practical* importance in respect to the commonwealth, and only with special reference to this importance, that the legislature has sometimes considered it necessary to interfere. This was indeed the principle which led to that misdirection of legislation within the theological domain to which allusion was made above ; for "the salvation of souls" was

the very practical object which the legislators then aimed at.

If we look at the matter from this point of view, and if we begin by fixing our attention on those sciences which have the most direct influence on the commonwealth, and upon social order, it would seem to follow from what has been said above, that properly civil law ought not to be brought to bear upon any kind of misdemeanour except such, the criminality of which is accepted by the *general sense of morality*, that is to say, the criminality of which is as well proved a truth as can be obtained within that sphere; and, in reality, the more legislation deviates from this rule, the more dangerous is the path it enters upon, and the more it runs the risk of entailing upon the community results leading to demoralization and evils of various kinds. There are, indeed, many legal regulations, trespass against which cannot strictly be looked upon as an infraction of the common law of morality, but in regard to which civil law must nevertheless assume a penal character; but the more the community can limit its action in this direction the better; and a wise legislator can hardly be too reserved upon such matters. Arbitrariness always embitters the minds of the people, and confuses the true conception of criminality. The story of Gesler's hat is very illustrative of this truth. It may therefore be demanded in justification of legislative measures of the kind in question, that their practical usefulness and neces-

sity, as regards *society in general*, should be clearly demonstrated by reasons which, although they may not be absolutely binding, ought at least to be as much so as the nature of the case will admit of.

In respect to the natural sciences there ought never to be a question of confirming certain theories concerning them, be they true or false, by means of positive laws or government regulations; but, although this rule has generally been observed, legislation has by no means refrained from applying,—but on the contrary has but too often allowed itself to apply,—real or supposed scientific knowledge to various regulations relating to economy and police; and it may be useful and interesting to point out a few instances of mistakes of the kind which ought to serve as incentives to caution in other similar cases.

First, and foremost, may be named the measures, now generally regarded as mistaken, by means of which governments endeavoured to lead and promote industry, but which, partly through misunderstanding of the natural laws on which they were based, partly because of the numerous obstructions which they laid in the way of individual enterprise, have greatly retarded the development of industry. At present there is little reason to fear legislative interferences of this kind, except when necessary for the promotion of enlightenment, and the removal of impediments; and should any particular regulations be needed in special cases, in favour of the general welfare, as for instance in questions of the

right to fish, to kill game, to cut down forests, it will now always be demanded that such measures should interfere as little as possible with individual freedom.

Another example may be drawn from the domain of public health. The generation has not yet passed away which beheld the measures for isolation and quarantine which were at one time adopted in Sweden to prevent the spread of cholera, and all the deplorable vexations which were caused thereby.

It may be remembered how many of these measures contributed, even more than the disease itself, to engender and spread a panic among the population; how this panic led to acts of the most revolting character, endangering both life and property; nay, it may be said, led to a *bellum omnium inter omnes*; and how, during all this, and in dependence upon the power of the above-named protective measures (the utter uselessness of which, every thinking person, however, soon discovered), those sanitary precautions which alone could afford any protection against the dreaded enemy, were but too often neglected. The very quarantine stations which were improvised, were frequently such as to constitute points of the greatest danger to health and life, because it soon became evident, beyond a doubt, that the protection which they promised against the spread of contagion was perfectly fallacious. Their arrangements were based upon a theory of the transmission of the disease, and of the best means of

checking it, which was discarded not many years later, together with a number of other regulations which, though founded on one uncertain theory, were carried out by the power of the law.*

The subject which we have just been touching upon, leads us nearer to the special question which we have undertaken to discuss. We have seen in the preceding example, that opinions based, if not on a false, yet on an insufficiently certified theory, and on an erroneous conception of its practicability, led to measures of a most mistaken and deplorable nature, while the persecution against persons suspected of infection constituted a perfect counterpart, though in a milder form, to the persecution of heretics in the theological domain; and this, although it hardly admits of a doubt, that a great number, nay, we venture to say by far the greater number of the members of our highly-enlightened medical body viewed with regret the measures alluded to, more particularly as eventually they only served to throw discredit on medical science, which was supposed to have dictated them; such being too often the result

* Any one who may be desirous of obtaining information on this subject (which is well worth their trouble) are referred to a work entitled, "Contributions towards General Enlightenment in the Question of Cordon and Quarantine Regulations against Cholera," by S. (Svedbom). If we be not mistaken, a return has been made to the original theory of the spread of cholera, but there can be no doubt that the institution of internal cordons, such as were formerly established, will never again come into question.

of building legal statutes on what is, and only professes to be, a scientific *hypothesis*.

We will now proceed to the consideration of the special example which we have undertaken to examine in this treatise, in order to ascertain whether possibly in this case also, which is likewise within the domain of medicine, reasons may not be found for questioning in how far the present legislation in our country is calculated to maintain the true dignity of science, and the real good of the public, or whether in this respect there still remains something to be desired. We openly confess that we began this investigation with a certain distrust of vaccination, and therefore, it may be said, not with perfect impartiality. Perhaps there are not many persons who, if they were to tell the whole truth, would not have to make a similar confession on beginning any investigation whatever. We have, however, endeavoured, as far as in us lies, to proceed without prejudice in our examination of this question, in regard to which, alas, the existing differences of opinion seem to be assuming the character of party opinions—a state of things which ought never to exist in regard to a purely scientific question. However, in order to place the reader in a position to test our calculations and conclusions, we communicate *in extenso* all the most important statistical materials which we have used for our purpose, so that he will find it easy to verify, not only the data themselves, but also the arguments based upon them.

The conclusions to which we have come differ essentially on many points from those which other authors, resting upon the same statistical data as ourselves, think they are entitled to draw, and which conclusions of theirs undeniably constitute the general opinion on the subject.* We nevertheless hope that this circumstance will not prevent the reader from giving his benevolent and careful attention to our statement, which, whether or not it be considered convincing by unprejudiced judges, at all events originates in a serious endeavour to elicit truth as far as possible. In addition, we must remark that the whole of our exposition is based exclusively upon *Swedish* experience, partly because the author has but little acquaintance with any other, and partly because, as a general rule, it is difficult in regard to foreign countries to judge of the value of the data with which one has to work, with the accuracy which is necessary in investigations of this kind if a reliable result is to be obtained.

The statistical records concerning small-pox date in Sweden from the very commencement of the

* In connection herewith, we may specially indicate a recent publication, viz., the ninth number of the valuable periodical, "*Ur vår tids forskning*" (The Scientific Researches of our Day), which we have reason to look upon as representing the opinions prevailing among men of science, as well as the general public, and to which we shall therefore repeatedly refer. For the sake of brevity, we shall, in so doing, indicate the work by the letters V. T. F.

Tables, in the year 1749. Shortly after this time the first attempts at inoculation of small-pox took place, but that process never became popular in this country. Up to the year 1756, only four children were inoculated. One of the principal promoters of inoculation, Dr. Schultz (afterwards Schultzenheim),* said in the year 1757, referring to this subject, that "inoculation of small-pox, which in Sweden is only just beginning, and which in England is only thirty-six years old, requires as yet not only to be provided with new reasons, but also with new attestations, based on the most remarkable experiences," and on account of the uncertainty thus expressed, and the dangers which are supposed to attend inoculation, it never, in spite of the zealous efforts of individuals, made any marked progress. In consequence of a proposal made by the Secret Committee in the year 1762, that His Majesty would be pleased to take effectual measures for putting a stop to the excessive mortality among children, and more especially to the "unknown child's disease,"† there were issued in

* In Sweden, where men who distinguish themselves in any science or profession are frequently ennobled, it is customary to make some change in their names on the occasion.—TRANS.

† This is probably to be understood as referring to the returns made by the parish clergy mentioning children as having died from "unknown" disease. Among causes contributing to the great mortality among infants, it was maintained that in many parts of the realm the children were taken too early from the mother's breast in order to enable her to resume her work in the fields, or other outdoor labours.

the year 1763 new instructions to the Medical Board, wherein, among other things, the Board was recommended to "promote the inoculation of small-pox, but carefully, so that the infection might not spread to other and younger children, who cannot as yet be inoculated, whereby the loss might be greater than the gain obtained by the inoculation of the older ones, and, above all, to instruct the common people how the children should be treated when suffering from natural small-pox, and at the same time to exercise supervision as to that point, because many more children die from want of care than from infection." But in spite of this admonition, and notwithstanding the example set by several persons in the higher classes, and more particularly by five members of the royal family, who allowed themselves to be inoculated in the year 1769, the matter did not gain the sympathy of the general public.*

In the year 1772 there was indeed instituted in Stockholm a special inoculation department in connection with the Lying-in Hospital, but the public availed itself so little of the institution, that after it had dragged on an existence for a few years, its abo-

* That the inoculation of small-pox was considered a very serious matter, is shown, among other things, by the striking of a medal in remembrance of the heroism of a lady of rank who allowed her children to be inoculated, and also by the special prayer which was read in all the churches on occasion of the inoculation of the above-named royal personages, asking for the blessing of God on this important undertaking—proceedings which, whatever may have been the effect of the example given, must have contributed to terrify, rather than to reassure the public.

lition was proposed in 1781, it being further proposed that the inoculation should take place in the home of the child, while Dr. Bergius, who was very zealous in the cause, found it in the year 1784 so little popular, that he knew no better advice to give than to render it compulsory.* Matters remained in this state until the end of the century, when at last, after application from the Medical Board, asking that inoculation for small-pox might be allowed in the homes of the people, His Majesty, in letters patent, March 12th, 1799, gave his consent to this, but with a special provision that “you shall be bound in reference to the matter, not only to exercise careful supervision so as to make sure that such inoculation be not practised except when the natural small-pox threatens to spread, but also over the choice of the medical men to whom the matter is entrusted, and to see that they carry out the undertaking with all the zeal and minute attention that so important a matter requires ; and you shall furthermore be bound at the end of the year to deliver unto us an humble report as to how far the attempt has succeeded, and whether or no it has had any useful effect.” Now, whatever might have been the possible result of this governmental resolution under other circumstances, we cannot at present say ; but one thing is certain, that it came too late, as the dawn of vaccination began in this country only a few years later, and

* See his treatise on the subject in the transactions of the Royal Academy of Sciences for that year.

seemed at once to throw the question of inoculation into the background.

This short historical sketch* will suffice to show, what is indeed generally known, that inoculation of small-pox in this country never was more than an *experiment*, which was carried out on so small, or rather on so thoroughly insignificant a scale, that whatever may have been the results obtained in special cases, they cannot be considered as having had any perceptible influence on the general solution of the question. In fact, it never gained a footing for itself, except among persons of rank, who desired to set an example, and in the reports of the medical men to the Medical Board we often find the names given of the persons who have allowed their children to be inoculated.

The very year that vaccination was introduced, Dr. Acksell, of Kalmar, states in an official report (dated 30th March, 1801), "that it is impossible to convince the lower classes of the advantages of inoculation. Dr. Colliander, medical officer of the province, and I, have had it announced to the people from the pulpit, that we were ready to give our services, gratis, in inoculating their children, but not a single person applied." And such was, undoubtedly, really the state of things throughout the kingdom.†

* Taken partly from the original documents, partly from Berg's "Clinical Lectures on Infantile Diseases."

† This opinion seems also to be shared by the author of "V. T. F.," and cannot be gainsaid.

In the year 1801, vaccination began to be practised in Sweden. Although it was at first received with distrust by some of the leading medical authorities, its advantages, nevertheless, grew so speedily in favour with the mass of medical men, that the Medical Board ventured already in 1803, to make proposals for its general introduction. Royal letters patent of 1804 and 1805 decreed the measures to be taken for the encouragement of vaccination, which was, however, not to be compulsory, and in the almanacs for the year 1806 there were inserted, for the enlightenment of the general public, information and advice regarding inoculation with vaccine as “a certain means for the prevention and extirpation of infectious small-pox.” That the novel proceeding, nevertheless, only wound its way slowly into the confidence of the people, is a matter of course, and it was not until 1812 that a Committee of the Diet ventured to recommend a compulsory law for the general introduction of vaccination. This principle was confirmed by the Diet of 1815, a resolution of which, bearing upon the subject, led to the Royal Decree of 6th of March, 1816, which renders vaccination obligatory under penalty of fines and imprisonment. Several further decrees on the subject have since then been issued, and have modified the previous regulations on one point or another; but the fundamental principle of obligatory vaccination remains unaltered.

It has been necessary to recapitulate these well-

known circumstances, in order to enable the reader better to judge of the greater or less relevancy of the statistical comparisons introduced in the sequel. The first question to be answered by these numbers is this: *has the GENERAL MORTALITY decreased through the influence of vaccination?* Every one will see the importance of the solution of this question in relation to the principal question.

We shall begin, then, with giving our statistical materials, viz., the statements concerning population, general mortality, and deaths from small-pox during the years 1749—1872, extracted from the “Official Statistics of Sweden,” and contained in table A, given on pp. 19—22. The earlier data in this table are such as they were originally calculated by Wargentin, with the necessary corrections, and with addition of such further corrections as were subsequently made in particular cases, by the statistical commission, and which may be considered as pretty reliable. It is worth remarking that with respect to a disease such as small-pox, there is little reason to fear errors in the returns as regards the nature of the disorder. What is more to be feared is that in earlier times omissions in the primary returns may have occurred, so that in consequence the returns of death by small-pox may be somewhat below the real numbers. Should this be the case, which we cannot undertake to determine, it tends to show still more strongly the correctness of the conclusions which we shall present in the sequel. On the other hand we must

not omit to point out, that up to the year 1773 inclusive, the column headed "deaths from small-pox" comprises also deaths from measles, as, up to the year 1744, these two diseases were added together in the tables. In order to make the necessary reduction called for by this state of things, we have considered it advisable, for the years immediately following 1774, to examine into the proportion of deaths from small-pox and deaths from measles, and to make the proportion thus found the basis of the reduction.*

We have thus found that the numbers in the tables up to, and inclusive of, the year 1773, must be multiplied with 0.85. Now, as it will be shown in the sequel, that small-pox, as an epidemic, was upon the whole on the decrease during the period in question, it seems reasonable to assume that the reduced number referred to above, is rather too small than too large; but, however this may be, it has no effect upon the principal result of the following calculation, although certain numerical values will appear somewhat unequal. We will, therefore, give the numbers exactly as they appear in the tables of the "Official Statistics of Sweden," and will only, when occasion requires it, state in notes the corrections which ought to be made, in accordance with the circumstances named above.

* For this purpose we have added together the returns in the volume of the manuscript tables, which comprises the years 1774—1785.

I Table A.

Year.	Population.	Deaths.	Deaths from Small-pox.
1749	1,746,449	49,516	4,453
1750	1,763,338	47,622	6,180
1751	1,785,727	46,902	5,546
1752	1,799,188	49,467	10,302
1753	1,819,245	43,905	8,000
1754	1,837,314	48,645	6,862
1755	1,853,689	51,090	4,705
1756	1,867,070	52,062	7,858
1757	1,870,372	55,829	10,241
1758	1,867,699	60,527	7,104
1759	1,876,994	49,162	3,910
1760	1,893,248	46,721	3,568
1761	1,916,848	49,143	5,731
1762	1,930,541	59,994	9,389
1763	1,940,011	64,180	11,662
1764	1,954,077	53,364	4,562
1765	1,964,824	54,566	4,697
1766	1,981,600	49,726	4,092
1767	1,997,447	51,272	4,189
1768	2,006,790	54,751	10,650
1769	2,015,127	54,991	10,215
1770	2,030,574	53,071	5,215
1771	2,041,081	56,827	4,362
1772	2,025,037	76,362	5,435
1773	1,972,407	105,139	12,130
1774	1,997,809	44,463	2,065
1775	2,020,847	49,949	1,275
1776	2,041,289	45,692	1,503
1777	2,057,147	51,096	1,943
1778	2,073,396	55,028	16,607
1779	2,089,624	59,325	5,102
1780	2,118,281	45,731	3,374
1781	2,132,912	54,313	1,485
1782	2,140,986	58,247	2,482
1783	2,143,570	60,213	3,915

Year.	Population.	Deaths.	Deaths from Small-pox.
1784	2,145,213	63,792	12,453
1785	2,149,773	60,770	5,077
1786	2,156,109	55,951	671
1787	2,163,862	51,998	1,771
1788	2,171,866	57,320	5,462
1789	2,163,765	69,583	6,764
1790	2,158,232	63,598	5,893
1791	2,178,719	55,946	3,101
1792	2,211,643	52,958	1,939
1793	2,239,119	54,376	2,103
1794	2,266,990	53,377	3,964
1795	2,281,137	63,619	6,740
1796	2,300,793	56,474	4,503
1797	2,322,814	55,036	1,733
1798	2,344,228	53,862	1,357
1799	2,356,993	59,192	3,756
1800	2,347,303	73,928	12,032
1801	2,356,027	61,317	6,057
1802	2,374,358	56,035	1,533
1803	2,392,837	56,577	1,464
1804	2,408,108	59,584	1,460
1805	2,427,408	56,663	1,090
1806	2,428,729	65,728	1,482
1807	2,434,721	62,318	2,129
1808	2,418,840	82,311	1,814
1809	2,382,075	93,532	2,404
1810	2,377,851	75,607	824
1811	2,396,581	69,246	698
1812	2,407,679	73,095	404
1813	2,416,548	66,266	547
1814	2,434,541	60,959	308
1815	2,465,066	57,829	472
1816	2,497,484	56,225	690
1817	2,521,442	60,863	242
1818	2,546,411	61,745	305
1819	2,561,780	69,881	161
1820	2,584,690	62,930	143

Year.	Population.	Deaths.	Deaths from Small-pox.
1821	2,510,870	66,416	37
1822	2,646,314	59,390	11
1823	2,689,031	56,067	39
1824	2,726,877	56,256	618
1825	2,771,252	56,465	1,243
1826	2,804,926	63,027	625
1827	3,827,719	64,920	600
1828	2,846,788	75,860	257
1829	2,863,132	82,719	53
1830	2,888,082	69,251	104
1831	2,901,039	75,274	612
1832	2,922,801	68,078	622
1833	2,959,141	63,947	1,145
1834	2,983,055	76,294	1,049
1835	3,025,439	55,738	445
1836	3,059,356	60,763	138
1837	3,076,184	75,611	361
1838	3,090,262	74,309	1,805
1839	3,106,459	72,988	1,934
1840	3,138,887	63,555	650
1841	3,173,160	61,279	237
1842	3,206,776	67,177	58
1843	3,236,632	69,115	9
1844	3,275,133	66,009	6
1845	3,316,536	62,074	6
1846	3,342,927	72,683	2
1847	3,362,072	79,405	13
1848	3,397,454	66,513	71
1849	3,441,286	67,842	341
1850	3,482,541	68,514	1,376
1851	3,517,759	72,506	2,488
1852	3,540,421	80,090	1,534
1853	3,562,543	84,047	279
1854	3,605,321	70,846	204
1855	3,641,011	77,734	41
1856	3,672,988	79,618	52
1857	3,687,601	101,491	560

Year.	Population.	Deaths.	Deaths from Small-pox.
1858	3,734,240	80,498	1,289
1859	3,787,735	75,720	1,470
1860	3,859,728	67,502	708
1861	3,917,339	71,829	193
1862	3,965,899	84,350	148
1863	4,022,564	77,227	307
1864	4,070,061	81,937	741
1865	4,114,141	79,216	1,336
1866	4,160,677	82,666	1,217
1867	4,195,681	82,072	1,061
1868	4,173,080	87,807	1,429
1869	4,158,757	92,775	1,474
1870	4,168,525	82,449	764
1871	4,204,177	72,046	329
1872	4,250,412	68,802	346

In order to be able to found any reliable calculations upon these returns, we must first of all divide them into distinct periods, for which an average may be taken. We have considered it advisable to make this division into decades, and we have thus obtained the table (B) given opposite, which will serve as a basis for the subsequent arguments. As the total number of deaths during each of these periods mounts up to more than half a million, and the total number of deaths from small-pox is also considerable, it seems reasonable to attach no small importance to these averages.

Table B.

Decade.	Population.	Deaths in 1 year.	Deaths in 1000 of population in 1 year.	Deaths from Small- pox in 1 year.
1749—1758	1,821,009	50,556	27.76	7,125*
1759—1768	1,946,258	53,288	27.38	6,246*
1769—1778	2,028,141	59,262	29.22	5,075*
1779—1788	2,140,315	56,766	26.52	5,179
1789—1798	2,246,744	57,883	25.76	3,810
1799—1808	2,394,432	63,365	26.46	3,282
1809—1818	2,444,568	67,537	27.63	690
1819—1828	2,787,025	63,122	22.60	373
1829—1838	2,976,829	70,168	23.57	633
1839—1848	3,255,604	68,080	20.91	299
1849—1858	3,588,571	78,218	21.80	816
1859—1868	4,016,690	79,033	19.68	861

As compulsory vaccination was decreed in the year 1816, and it cannot be supposed that it was thoroughly introduced for a year or two after that, we shall probably be in the right if we reckon the period of the general establishment of vaccination as comprised within the decade 1819—1828.

The preceding decennium, 1809—1818, when vaccination had indeed begun to be pretty generally practised, but was still voluntary, may probably be considered as a *transitional period*, and requires, as will be seen in the sequel, to be treated of specially. The whole of the preceding period, 1749—1808, we consider as *pre-vaccinational*.

It is true that, as has already been said, the practice of vaccination commenced in the first years of

* Applying the corrections named on p. 18, the three first numbers in this column should be 6,056, 5,309, and 4,535.

the present century; but, seeing that entirely reliable returns of the number of vaccinated persons during these years are wanting, also taking into consideration the general historical information regarding the subject which we have already given, and remembering on the one hand the distrust which had previously been evinced with respect to inoculation, and on the other hand, the slowness with which new ideas generally make their way among the masses—we cannot reasonably assume that vaccination can have spread in any very important degree, or have produced any great effect,* previous to the year 1808.

The insignificant errors which may possibly have arisen in this way may be considered as entirely disappearing in the averages; and we have, therefore, in order not to be obliged to reject any of the statistical materials bearing on the subject, considered it feasible to include in the manner named, the decade 1799—1808 in our calculation; and the more so because, if we take the pre-vaccination period as ending with the year 1798 (in which case no mistake can be made in regard to the matter), the conclusions will in all essential points remain the same, though one or two numerical values may be slightly changed.

Now, if we take the average mortality for the two unequal periods of time, we find that during the years 1749—1808, that is to say, the period *previous*

* Some data in confirmation of this will be given in the sequel.

to the introduction of vaccination, the number of deaths was 27.18 in every 1000 persons, and during the years 1819—1868, that is to say, the period *subsequent* to the general introduction of vaccination, the number of deaths was 21.71 in every 1000, or 5.47 more deaths during the first than during the second period; and it must be observed with regard to this, that the change to the better result took place contemporaneously with the definitive carrying out of vaccination.* It seems that at first sight nothing could be more reasonable than to attribute the result in question to the influence of vaccination; but, on further examination, it will soon be perceived that such a conclusion would be very precipitate. A difference of 5.47 deaths in the thousand corresponds, in a population of 3,324,944 (which is the average during the second period), to not less than 18,187 deaths. Now, if the greater mortality during the first period was owing to small-pox, then, in case no change took place with respect to small-pox the deaths from this disease during the second period ought to have amounted to 18,187 + 596, which latter is the average number of deaths from small-pox, which actually took place during that period, and thus, the total number ought to have been 18,783. But the average mortality from small-pox during the first period, 1749—1808, was only 5119; consequently, if *no* diminution of the small-pox

* During the transition period, the death-rate was 27.63 in a thousand, as will be shown in the sequel.

disease took place, we may suppose that during the second period the number of deaths from small-pox amounted, after due allowance for the increase of population, at the highest to 8120, *i.e.*, to less than half the number, 18,783 ; and more than this, there can of course in no case be any possible reason for accepting.*

However, if we look more closely at the column headed "deaths from small-pox" in table B, we find this remarkable circumstance (which will be further touched upon in the sequel), that the number of deaths gradually *decreases* during the whole of this period, and it is consequently probable, that in making the present calculation, we ought properly not to use the *average* number, but the *last term* in the decreasing series, *i.e.*, the number 3282 (in fact, we ought to take a smaller number still), and we shall then, after correction for increase of population, find that we get 4557 deaths instead of the 18,783 stated ; or in other words, that the decrease in the mortality from small-pox, and with it the supposed cause of this decrease, vaccination, cannot possibly, speaking arithmetically, explain more than at the *highest* about *one-fourth* of the actual decrease in the general mortality ; and the conclusion readily suggests itself, that the circumstances, whatever they may have been, which caused the *three-fourths* of the

* Allowing for corrections of the first three numbers in the earlier series we get the number 7447, instead of 8120.

greater number of deaths during the pre-vaccination period, may possibly also have caused the *remaining fourth*; in which case the influence of vaccination on the general mortality would be $= 0$. [See below.] And it is quite impossible to prove from general statistics that this was not the case, because, as we shall immediately show, reasons for the assumption which we have just stated, may really be found.

In fact, if we go back to the decade 1809—1818, which we have denominated a transition period, we find that the number of deaths from small-pox fell to 690 (from 3282, which it had been during the preceding decade), that is to say, very nearly as low as the average has been since then; for the total mortality amounted to 27.63 in every 1000 inhabitants. Now, if we assume, first, that this considerable diminution in mortality from small-pox was *not* the result of vaccination, the practice of which had then already begun, but that it must be attributed to the same causes, whatever they may have been, which, as we have already observed, led to the gradual decrease of small-pox epidemics from the middle of the last century, it follows that in making the above calculation we have to consider, not 3282 but 690 as the last term of the decreasing series; and holding this in view we find, according to the same calculation as before, the number 938 instead of 18,783; consequently that vaccination can at the highest account for no more than about *one twentieth* part of the diminished mortality, or, in other

words, that it may from this point of view be considered as insignificant.

If, again, we assume that the decrease in the mortality from small-pox during the period in question, was really caused by vaccination, then we find that although vaccination in this case succeeded in almost totally extirpating small-pox, the general mortality, nevertheless, not only did not diminish during the same period, but was, on the contrary, with one or two exceptions, greater than during any decade of the pre-vaccination period.

The successive number of mortalities in 1000 inhabitants was as follows :

Decade.	Deaths.
1749—1758	27.76
1759—1768	27.38
1769—1778	29.22
1779—1788	26.52
1789—1798	25.76
1799—1808	26.46
1809—1818	27.63

The causes of the great mortality during the last mentioned decade are not difficult to find. They ought, doubtless, to be sought for, partly in the sickness occasioned by the war of 1809—1810, which, as is shown in table A, increased the death-rate in an extraordinary degree, partly in the bad harvests of which that of the year 1812 in particular seems to

have been most disastrous in its consequences from the point of view in question. In how far the war of 1813 had any appreciable influence on the increase of mortality we shall not undertake to determine. Comparatively this influence cannot have been very considerable.

But these same causes of increased mortality, viz., war and failure of crops, and more especially the latter, prevailed in a terrible degree during the earlier of the two periods we have under examination. We have by this time in our country, thanks be to God, almost forgotten the import which the dread words, failure of crops, formerly bore. Gradually, as agriculture and other industries have been developed (more especially since 1820), and since the internal means of communication, and the financial circumstances of the country, have been improved, that which was formerly meant by dearth, has almost become an impossibility, or, should it occur, its evil consequences would not be such as could in any way be compared with what infallibly took place in former times under such circumstances. The present generation has only acquired, through the bitter experience of the famine in Finland in 1860 (when, in some communities, more than twenty per cent of the population were carried away in one year), a conception of the fearful character of such a misfortune, and of the colossal effects it has on the increase of deaths. According to the statements in the "Official Statistics of Sweden," in which O

represents dearth, I. almost general dearth, deficient harvest, II. III. scanty, IV. weak, V. below average, VI. average, VII. above average, VIII. good, IX. abundant, harvest, we find that during the period of which we are treating, there occurred in Sweden the following years of dearth :

Table C.

Year.	Quality of Harvest.	Year.	Quality of Harvest.
1756	I	1783	I
1761	I	1785	I
1762	o	1798	I
1764	I	1799	I
1771	o	1800	I
1772	I	1812	I
1775	I	1816	I
1780	I	1826	I
1781	I	1841	I
1782	I		

We find thus, that while during the fifty years *subsequent* to 1818 there were only two years of dearth, there were during the seventy years *previous* to 1818 not fewer than seventeen years of such. One may therefore reckon that during the last-named period every fourth year was a year of scarcity ; and when to this is added that what was formerly entered as "average" harvest, would now probably be considered as partial dearth, and that on the contrary, what we now call dearth, would probably for

merly have been considered little less than an average harvest, it is easy to conceive the importance of this consideration. We also find, for instance, that during the years 1771-1772, in which there were bad harvests, the consequence was that the death rate in the subsequent year 1773 rose to about *double the usual number*. During the whole of the period from 1780 to 1789, bad harvests were, so to say, a chronic disease; the years 1798, 1799, and 1800 were all years of dearth, and so on. If we add to this the influence of three wars, viz., the Pomeranian war, and the first and second Finnish wars—the disastrous consequences of which latter, from a sanitary point of view, seem partially to have fallen upon the period previous to 1809—we may, without doubt, find herein sufficient reasons for a mortality such as prevailed during the years 1809—1818. We see, for instance, that the mortality of the years 1809, 1810 exceeded the average mortality of the decade by not less than one-half of this average; but that, on the other hand, as has just been pointed out, the mortality for the year 1773 alone exceeded the average mortality of the decade by more than three-quarters of that number. The mortality of the two years 1789, 1790 exceeded the average of the decade by almost one-third of that number; but during that decade the number of deaths was only 25.76 in a thousand, while in the decade in 1809—1818 it was 27.63. If, on the other hand, we take into consideration that during the last sixty years Sweden has

enjoyed uninterrupted peace, that during this period extraordinary progress has been made in all directions, that the national wealth has greatly increased, that improvements have been introduced in sanitary matters, and in the care of the sick, and more particularly of children, we find quite sufficient reasons for the diminished mortality during the last decades as compared with what obtained in the 18th century.*

* The author of V. T. F., reasoning from similar grounds, arrives at the same conclusions as those given above, but in so doing involves himself, it seems to us, in a rather striking contradiction. "These numbers," he says, "afford strong evidence of a gradually progressive increase in the length of life in Sweden. It is far from my thought to attribute this increase to vaccination; it is, in my eyes, a joyful proof of the increasing prosperity of the people, and the more easy circumstances of life, and I venture to believe also of the progress of the medical art. I have only endeavoured to exonerate vaccination from an unjust suspicion." [The suspicion of causing other diseases which have taken the place of small-pox.] Now this leads to the question, if, as the author says, vaccination has no part in the improved sanitary circumstances of later times, such as are evinced by diminished mortality and increased length of life, what then has vaccination really effected? Naturally, according to our author, the eradication of small-pox. But then, according to him, the eradication of small-pox has not contributed to the general decrease in the death rate. And if this be so, what does the author mean by the dark picture he has drawn, and endeavoured to elucidate by a diagram, of the devastations caused by small-pox in olden times—a picture from which, when compared with the whole drift of his work, the reader can hardly receive any other impression than that the greater mortality of those earlier years was owing to *small-pox*, and that the more favourable subsequent circum-

The death averages during the pre-vaccination period, and during the decade 1809—1818, were pretty equal, viz., during the former period 27.18, during the latter 27.63. Now if it be allowable to assume, as we have endeavoured to establish in the preceding pages, that during these two periods the baneful influences affecting health and life were, upon the whole, pretty equal, it is very difficult to get rid of the persuasion that *if* during the pre-vaccination period the mortality from small-pox alone had been merely equal to that which occurred during the years 1809—1818, then, nevertheless, the *general mortality* (as all other matters, and also as we suppose all forms of disease, inclusive of small-pox, were equal) could not be otherwise than also equal; and that consequently, as we have pointed out, the influence of vaccination on the *general death-rate* must have been nil. We are ready to concede, however, that this is no *proof*, and having no professional knowledge of the matter, we must leave untouched those objections which might possibly be raised from the *medical* point of view. But it is difficult for us to see how any other conclusion can be arrived at from the purely statistical side.

stances are due to the influence of vaccination. We fear that the author has, in order to defend vaccination against objections raised in certain quarters, lost sight of that which the partisans of vaccination at other times really include in its list of merits. As for ourselves, it is because we believe, and not without reason, that this last-named view of the subject is the most usual, that we have endeavoured so laboriously to prove its want of foundation.

At first sight it cannot fail to strike us as strange that the disappearance of so severe a form of disease as small-pox, which, during the pre-vaccination period, of itself caused the mortality on the average of a decennium to rise to as much as two and three, and even more, for every thousand inhabitants, should have had no effect upon the general death-rate, or that the general death-rate should not as a matter of course be greater when the small-pox prevailed than when it did not exist. But if we examine the subject more closely we shall find that the opinion which underlies what has here been said, not only is not proved, but that moreover it has analogy against it. Although this does not properly belong to our subject, we nevertheless consider it worth while to give a few hints relating to it. We shall begin with inquiring what our statistical tables have to say to us concerning the death-rate in various kinds of diseases. The official statistics of Sweden contain the following data [Table D] concerning the under-named forms of disease; but we only admit into our pages the data on the subject relating to later times, on account of the uncertainty in the diagnosis which may possibly have obtained as regards some diseases in the earlier notices.

Table D.

Year.	DEATHS FROM																Total.
	Small-pox.	Scarlatina.	Measles.	Diphtheria.	Croup.	Whooping Cough.	Epidemic Brain Fever.	Typhoid Fever.	Ague.	Dysentery.	Diarrhœa.	Cholera Morbus.	Puerperal Fever.	Ergotismus.	Scurvy.	Mumps.	
1861	193	1,453	507	257	888	1,856	321	1,110	358	879	376	79	147	47	13	11	8,495
1862	148	1,684	7,407	1,191	1,333	1,549	277	1,069	367	326	255	31	200	25	13	18	15,893
1863	307	1,324	2,527	1,822	2,116	749	286	957	103	394	190	39	222	8	4	12	11,062
1864	741	2,549	243	2,259	1,440	1,148	243	1,139	72	423	204	29	291	24	11	14	10,830
1865	1,336	4,448	182	2,023	1,033	602	250	1,591	49	596	311	118	299	31	16	19	12,904
1866	1,217	4,063	165	1,302	921	468	430	1,862	54	81	263	4,706	197	104	8	19	16,186
1867	1,061	1,903	126	875	605	768	436	1,862	43	46	215	60	244	68	24	9	8,346
1868	1,429	2,199	1,129	491	659	2,414	356	4,240	45	251	686	198	202	41	12	22	14,374
1869	1,474	4,396	5,332	688	706	1,262	261	4,069	64	38	214	18	286	14	6	19	18,847
1870	764	4,817	339	570	669	371	215	2,986	37	133	887	44	380	15	6	15	12,248

If we calculate the relation between the minimum and the maximum of each of the forms of disease contained in this table during the periods in question, and also of the general mortality according to table A, we get the numbers given below.

Mortality from all causes : minimum to

maximum = 1 : 1.29

For the sixteen undermentioned dis-

eases together = 1 : 2.26

Epidemic Brain Fever = 1 : 2.03

Mumps = 1 : 2.44

Puerperal Fever = 1 : 2.58

Croup = 1 : 3.50

Scarlatina = 1 : 3.64

Typhoid Fever = 1 : 4.43

Diarrhœa = 1 : 4.67

Scurvy = 1 : 6.00

Whooping Cough = 1 : 6.51

Diphtheria = 1 : 8.79

Ague = 1 : 9.92

Small-pox = 1 : 9.96

Ergotismus = 1 : 13.00

Dysentery = 1 : 23.13

Measles = 1 : 58.78

Cholera Morbus = 1 : 261.44

This table shows us that the total number of deaths in each year, during the period in question, was pretty much the same ; that even the numbers of deaths from the sixteen diseases mentioned taken together, did not vary more than in the proportion

of 1 : 2 ; but that the mortality from the separate diseases varied very much, as regards the greater number of them, and that small-pox can neither be reckoned among the most nor the least variable. Although the period in question is far too short to allow us already to draw with certainty from the statistical data all the interesting conclusions which will no doubt in future be based upon them, it is nevertheless difficult, when looking at the numbers in this table, not to be struck by the probability, that the general mortality of any given time is really only dependent upon the existing circumstances as to means of living, sanitary measures, morals, &c. ; in a word on the general causes of health and illness, life and death (with particular reference to the hereditary conditions of the race as regards health), and that where these influences are equal in their combined action, death will effect the same quantitative amount of work, although he may at different times use very different means, *i.e.*, different diseases, for carrying it out. That different diseases are prevalent at different times, as also that the same disease may appear in various modified forms at different times, was indeed already known to Hippocrates. This tends to show how little importance should be attached to any of the individual forms of disease, because, even under the same conditions, one disease only seems to give way that another may come in ; and it must therefore, upon the whole, be of little significance whether or not we can succeed in entirely eradicating any given form of disease.

One or other of the more serious epidemics may indeed cause an exception to the rule during one year, or two, but this exceptional state of things disappears when we examine returns relating to a large population or to a longer period of time. It is on the other hand interesting to see how the remarks in question may be eventually applied to a few forms of disease only. During the last century small-pox had a powerful ally in typhus, and the returns relating to this last-named disease go as far back as those relating to small-pox, as will be seen in the table given below, in which, however, we have only compared the averages of periods of ten years.

Table E.

Period of ten years.	Total number of deaths.	Deaths from small-pox.	Deaths from typhus.*	Total of deaths from small-pox and typhus.
1749—1758	50,556	7,125	3,941	11,066
1759—1768	53,288	6,246	5,797	12,043
1769—1778	59,262	5,075	7,202	12,277
1779—1788	56,766	5,179	5,463	10,642
1789—1798	57,883	3,810	6,485	10,295
1799—1808	63,365	3,282	6,895	10,177
1809—1818	67,537	690	7,973	8,663
1819—1828	63,121	373	5,912	6,285

The returns relating to typhus cease with 1830.

* Called in the older tables "Spotted Fever," which, in the "Official Statistics" of Sweden, has been translated into "Typhus and Typhoid Fever."

It will be seen by this table that, up to the close of the last century, these two diseases proceeded side by side, and that during the long period from 1749 to 1808 they caused together about one-fifth of the whole mortality, the proportion between the minimum and the maximum having been for small-pox as 1 : 2.17, for typhus as 1 : 1.75, and for both together as 1 : 1.20.* It will be found by adding together 2 and 2 decades, that during the same period 1749—1808, the mortality from typhus gradually *increased*, although not exactly in the same proportion as the mortality from small-pox *decreased*, that is to say, if we may accept the returns respecting typhus as quite reliable.

But we will leave aside this subordinate question, in order to answer another question, which is more closely connected with our subject; however, before we go further we will, with reference to what has hitherto been said, dwell upon some considerations concerning the principal object of this treatise.

It has been shown above :

(a) With as much *certainty* as is possible in respect of a subject of this nature, that the diminution in the general mortality, which has taken place in later years, can only as regards a very small frac-

* After due correction of the first three numbers in the column "Deaths from small-pox," the proportions in the case of small-pox are 1 : 1.84; in the case of typhus, 1 : 1.75; and for both together, 1 : 1.17; but the changes in the number of population are not taken into account, which is, however, of little moment, as we do not attach great weight to these figures.

tion, be explained by the contemporaneous decrease in the deaths from small-pox ;

(b) With great *probability* that the same causes, which must be assumed as explaining the comparatively far greater portion of the decrease in the general mortality, must, according to the comparisons we have made, also be considered as fully sufficient to explain the remaining fraction, even if we had not small-pox to refer to in this matter ;

(c) That according to *analogy*, even if the complete eradication of small-pox should be proved to be feasible, it would not follow that the *general mortality* would therefore diminish, but on the contrary that under equal conditions, and taken in general, it seems to be independent of the greater or less frequency of one or other among the special diseases which are its immediate cause.

Putting all this together, it follows that, supposing even vaccination to be the cause of the decrease in the *mortality from small-pox* (which question we shall discuss in the sequel), it seems at all events to have been without any proved effect on the *general mortality*.

Now comes the question : are these circumstances of a nature to justify compulsory vaccination ? Do they fulfil the conditions which alone can justify a state in making a scientific theory the basis of penal legislation ? Where is the clearly demonstrated fundamental truth without which the legislator has no right to interfere in such matters ? Where is the *general*

use? Of what use is it to the public that a smaller number of the citizens die annually from small-pox (supposing that this result is brought about by vaccination) if an equally large number nevertheless die from other diseases? We can see no further advantage in it than there would be in a battle, if none of the men fell before the fire of the artillery, but all the more died from the fire of the line. To the individual it may possibly be more agreeable to die of any other disease than small-pox, and it ought, therefore, to be allowed to every one to endeavour to save himself, through vaccination, or any other lawful means, from an eventuality which he fears; but this cannot possibly, in itself, be regarded as the business of the *State*. It has, indeed, been said that it is even more on account of the living than of the dead that it is of so much importance to get rid of small-pox, because this virulent disease leaves behind it, to those who escape with life, consequences so fearful that they deserve almost as much attention as death itself. But that, again, is a matter which only touches the individual, so long as the consequences in question (pitting, eventual blindness, &c.), are not more injurious to the *race* than the possible permanent consequences left after other diseases. And is this the case? or is there no reason to fear that typhus, cholera, and many other diseases really entail many severe permanent effects, which perhaps are not the less serious though they be less visible than pitting? We greatly fear that science, at least at the present

time, is not in a position to deliver a satisfactory answer to this question. But if it cannot be proved either that the number of deaths has diminished through the decrease of small-pox of late years, or that the present generation is physically stronger or generally in better health than was the case at the time when small-pox was more prevalent, it is impossible to give any admissible reason for compulsory legislation, even though this might eventuate in the complete uprooting of small-pox.

Such is the conclusion to which an investigation into the general mortality of Sweden seems to lead us. Although this might be sufficient as regards the principal object which we have in view, we will, nevertheless, for the purpose of a more complete elucidation of the subject, also inquire in how far existing statistical data enable us to answer another question, which may, perhaps, be of still greater interest, viz., Has the DEATH-RATE FROM SMALL-POX *been reduced through the influence of vaccination?*—That as a general rule the mortality from small-pox has been less after, than before, the introduction of vaccination, there can be no doubt, as will be seen by tables A and B ; but it is another question how far in this respect *post hoc* also means *propter hoc*, that is to say, how far vaccination has been the cause of the result referred to ; for upon this point opinions may be divided. Before we proceed to the statement of the general statistical returns which seem to us to argue almost decisively against vaccination, we will touch

upon a special question, which it is very important to investigate with regard to our subject.

It has often been cited as a proof of the beneficial influence of vaccination, that during the pre-vaccination period the mortality among children was very much greater than it is at present ; that this mortality was caused by small-pox ; and that the improved state of things that has prevailed latterly is owing to the success of vaccination in extirpating this cause of death. Nothing can be more interesting than to see how matters really stand with regard to these points ; and, happily, statistical data relating to them are not wanting.

We give now the returns of the deaths occurring in each of the four ages, under 1 year, between 1 and 3 years, between 3 and 5 years, and between 5 and 10 years, for the period 1774—1798, in all 25 years. We limit ourselves to that period, partly to avoid all possible uncertainty arising from the confusion of measles with small-pox, partly because a period of 25 years seems to us sufficient for the object in view, and partly because it would have required more time than we can at present devote to the subject, to obtain the returns for the period previous to 1774 ; because all the numbers in question have to be found by calculation, and owing to the form of the manuscript tables these calculations are considerably more difficult as regards the remoter periods.

Table F.

Date.	Deaths at the undermentioned ages.			
	Under 1 year.	1—3 years.	3—5 years.	5—10 years.
1774	8,822	3,267	1,537	1,503
1775	13,214	5,042	2,293	1,993
1776	11,618	3,913	1,717	1,428
1777	13,208	5,698	2,171	1,921
1778	15,195	6,961	3,609	2,679
1779	16,399	8,711	5,001	3,834
1780	12,309	4,732	1,964	1,611
1781	13,686	5,717	2,762	2,752
1782	12,856	6,211	2,659	2,302
1783	13,152	7,490	3,860	3,983
1784	13,207	8,326	5,928	4,287
1785	12,994	7,136	3,912	3,566
1786	14,318	4,144	1,908	2,148
1787	12,760	4,179	1,679	1,641
1788	15,336	5,662	2,504	2,442
1789	15,669	6,281	3,002	2,842
1790	13,903	5,959	3,057	2,805
1791	13,413	4,605	2,127	2,168
1792	15,555	4,504	2,160	2,034
1793	15,393	5,315	2,111	2,155
1794	13,795	5,112	2,260	2,336
1795	14,756	6,444	2,894	2,717
1796	15,345	6,010	3,040	2,494
1797	15,733	4,938	2,324	1,964
1798	14,441	4,425	1,990	1,982
Average	13,875	5,629	2,738	2,464

Table G.

Years.	Number of population of the undermentioned ages.			
	Under 1 year.	1—3 years.	3—5 years.	5—10 years.
1775	53,682	84,701	83,584	164,271
1780	65,941	111,758	103,739	189,309
1785	56,340	103,049	105,304	209,007
1790	55,894	106,523	106,435	207,131
1795	60,903	120,650	116,721	222,573
1800	55,405	118,446	122,382	243,527
Average	58,027	107,521	106,361	205,970

For the sake of comparison we give the corresponding returns for the period from 1846 to 1870, likewise 25 years.

Table H.

Years.	Number of population of the undermentioned ages.			
	Under 1 year.	1—3 years.	3—5 years.	5—10 years.
1845	90,574	173,210	156,126	344,028
1850	97,037	184,497	156,173	371,347
1855	102,403	193,499	163,550*	389,667*
1860	119,426	215,384	178,731	407,870
1865	120,620	223,564	198,803	461,447
1870	106,633†	185,110	199,266	487,520
Average	106,115	195,877	175,441	410,313

* These two numbers have been found by interpolation, the official statistics for these years, giving the ages from 3 to 7 and from 8 to 10.

† The considerable decrease in the death-rate for this year is owing to a decrease in the number of births.

Table I.

Year.	Deaths at the undermentioned ages.			
	Under 1 year.	1—3 years.	3—5 years.	5—10 years.
1846 }	15,991	5,953	2,564	2,913
1850 }				
1851	16,891	5,991	2,608	3,050
1852	17,604	6,953	3,245	3,413
1853	17,940	7,654	3,413	3,632
1854	15,160	6,376	3,106	3,656
1855	16,672	6,372	3,006	3,643
1856	16,658	8,162	3,802	4,820
1857	19,743	11,302	6,774	8,601
1858	18,416	7,723	4,188	4,895
1859	18,836	7,016	3,397	3,791
1860	16,482	6,093	2,401	2,634
1861	17,382	7,443	3,040	2,818
1862	18,327	11,304	5,129	4,713
1863	17,806	8,617	4,619	4,318
1864	18,595	8,438	4,367	4,157
1865	17,918	8,544	4,463	4,476
1866	17,385	8,290	4,074	4,342
1867	18,053	7,090	3,086	5,067
1868	19,349	9,059	3,651	3,685
1869	17,154	10,554	5,585	5,717
1870	15,809	6,285	3,965	4,183
Average	17,285	7,561	3,729	4,392

Now, if we calculate in accordance with these tables the number of deaths at the various given ages to every hundred of the population of the same age, we get the following per-centage:—

Year.	Under 1 year.	1—3 years.	3—5 years.	5—10 years.
1774—1798	23.91	5.24	2.57	1.20
1846—1870	16.29	3.86	2.12	1.07

We do, indeed, see at once from this that the mortality of later years has been considerably less than in former times, but we see at the same time that it cannot have been vaccination during the one period, and the absence of vaccination during the other, which has produced this result ; because, if this were so, the effect would presumably be most perceptible during the ages from three to ten years (an age at which we may, in the present day, assume that all, or the greater number of the children, have been vaccinated) ; and on the other hand, considerably less during the ages up to three years, and more especially during the first year, when in the present day a great, if not the greatest number, of children are unvaccinated ;* whereas, if we calculate the percentage of the last cited numbers, and compare them with the corresponding per-centage of the earlier period, we find that the matter stands as follows :—

Under 1 year,		67.63 per cent.,	or a decrease of	32.36 per cent.
Between 1—3 years	73.66	„	„	26.34 „
„ 3—5 „	82.49	„	„	17.51 „
„ 5—10 „	89.17	„	„	10.83 „

Which numbers (showing to what extent the mortality of the respective categories of age have been less during the latter period than during the former) demonstrate that the decrease in the death-rate has been greatest during the age when little or no difference exists as regards vaccinated or non-vaccinated,

* It must be remembered that the legal time for vaccination begins only from the second year of life, as, on an average, about 15 per cent. of all children die during the first year of their existence, and of these 15 per cent. above 50 per cent. die in the course of the first three months.

and on the contrary *less considerable* during the age when the difference in question ought to have produced the *most* perceptible effects.

Considered from another point of view, the relative number of deaths from small-pox regarded as a child's disease (which, in reality, the epidemic was during the time in question) appears from the numbers contained in the following table, which specially refers to this view :—

Table K.

Year.	Deaths from Small-pox during the undermentioned ages.			
	Under 1 year.	1—3 years.	3—5 years.	5—10 years.
1774	579	770	377	247
1775	338	540	291	80
1776	281	637	381	28
1777	429	694	430	265
1778	4,465	4,514	3,164	953
1779	1,785	1,994	1,497	2,201
1780	869	1,015	669	549
1781	309	487	388	194
1782	627	739	504	390
1783	871	1,288	900	578
1784	3,016	3,783	3,189	1,801
1785	1,154	1,519	1,110	770
1786	215	189	126	95
1787	526	619	286	216
1788	1,697	1,824	1,024	716
1789	2,039	2,039	1,292	952
1790	1,664	1,842	1,203	829
1791	938	992	756	447
1792	670	545	359	260
1793	685	671	538	287
1794	1,131	1,275	739	653
1795	1,936	2,257	1,223	1,019
1796	1,292	1,655	1,099	703
1797	548	537	314	219
1798	371	405	247	184
Average:	1,137	1,233	870	585

Now if we first calculate the per-centage which these averages constitute on the corresponding population comprised within the respective categories of age, we find :—

For the age	under	1 year	1.96	per cent.
„	between	1—3 years	1.15	„
„	„	3—5	0.82	„
„	„	5—10	0.28	„

that on the one side, during the ages below 10 years, the mortality from small-pox has in general been considerably greater than during the more advanced ages, as during the period in question the per-centage of mortality of all ages taken together, varied between 0.24 per cent. and 0.17 per cent.; and on the other hand, that at the same time the death rate decreased considerably from the lowest to the highest of the four categories of age given. It is clear that this last circumstance *cannot* be ascribed to the absence of vaccination, which has been the same in regard to all the ages, but that it must result from other causes. However, it might perhaps be expected from the greater number of deaths from *small-pox* in the first category of age, that the epidemic as such had made itself most felt during *the first year of life*, whereas, in reality, it was quite different. If we calculate the per-centage of deaths from small-pox compared with the total number of deaths occurring in each of the categories of age that we are treating of, we find :—

Under	1 year	8.19	per cent.
Between	1—3 years	21.90	„
„	3—5 „	31.77	„
„	5—10 „	23.74	„

from which it results that small-pox did not cause quite one-twelfth of the deaths occurring within the first year of life, and that therefore in order to explain the great mortality of infants during that age we must seek for causes *quite other than the absence of Vaccination*. The decrease in the death-rate in this category, when we compare the two periods of time which we have had under consideration, amounts to more than 30 per cent., while, as we have just shown, small-pox does not represent much more than 8 per cent. of the mortality within the first category during the earlier period. And let not those forget who seek for more precise explanations regarding these matters, the statement quoted above from the Royal letter patent of the year 1763, that “more children die from want of care, than from the epidemic.”

On the other hand we find that the importance of small-pox as compared with other diseases, increases in a most surprising degree within the second, and particularly the third, category of age, but again decreases within the fourth. Within the second and third category occurs the epoch so significant for the physical development of the child, when it is weaned from its mother's breast, and begins to be nourished with food, which is but too often anything but wholesome. However, in how far this and other in-

fluences are to be taken into consideration, or what elective affinities for one or another disease may prevail during the various categories of age, we cannot undertake to decide ; but it does seem to us extremely difficult to find any connection between the absence of vaccination and the facts of which we have been treating.

Unfortunately there are wanting as regards the later period similarly explicit data to compare with those of the earlier period. We have indeed as regards the towns, and more especially the capital, returns for some years of the causes of death at various periods of age ; but these returns are as yet too insignificant as to numbers ; while at the same time the categories of age are selected in a manner which renders a comparison very difficult, so that we do not think that we can found any arguments upon them. We merely give as a specimen the death-rate returns for Stockholm, during the years 1864—1870. They are as follows :—

Under 1	year	.	.	6,859
From 1—3	years	.	.	2,971
„ 3—5	„	.	.	1,148
„ 5—10	„	.	.	908

Of these the deaths from small-pox, were :—

Under 1	year	.	.	180
From 1—3	years	.	.	124
„ 3—5	„	.	.	39
„ 5—10	„	.	.	21

Which latter numbers, if calculated in per-centage of the former, give the following result in the different categories :—

Under 1 year	. .	2.6 per cent.
From 1—3 years	. .	4.1 „
„ 3—5 „	. .	3.4 „
„ 5—10 „	. .	2.3 „

But for the reasons we have before stated we give these numbers without drawing any definite conclusions from them. So much, however, may be seen from them that now, exactly as during the pre-vaccination period, the mortality from small-pox is relatively greatest in the age from 1 to 5 years, or just at the very time when it would be supposed that the influence of vaccination would specially be felt.

We are thus obliged to leave this very interesting detail, to return to the general statistics of death, from which we have still to draw a conclusion of the greatest importance in regard to the question about which we are occupying ourselves—a conclusion which, according to our view at least, *places the whole of the vaccination question on an entirely new basis*, and which can hardly fail to awaken in every un-prejudiced mind the strongest doubts as to the supposed significance of vaccination in respect of small-pox.

If we take Table B and calculate the per-centage of deaths from small-pox in the sum total of deaths, we obtain the following numbers :—

Table L.

Period of ten years.	Per-centage of deaths from Small-pox in total number of deaths.
1749—1758	14.09 ^{*)}
1759—1768	11.72 ^{*)}
1769—1778	8.56 ^{*)}
1779—1789	9.12
1789—1799	6.58
1799—1808	5.18
1809—1818	1.02
1819—1829	0.59
1829—1838	0.90
1839—1849	0.44
1849—1858	1.04
1859—1868	1.09

To which must be added, that since at the present time (1873—1874) we are suffering from a small-pox epidemic, the like of which has not been known in Sweden in the memory of man, there is much reason to fear that the per-centage during the current decade will be even greater than that during the last decade.

Now it is shown by this table that since the middle of the last century, and during the pre-vaccination period, small-pox as an epidemic gradually decreased ;† that during the few first decenniums after

* With due correction these first three numbers stand thus :—11.97, 9.96, 7.28.

† That the third and the fourth term in the series exhibit a deviation, proves nothing more than that ten years constitute too short a period for taking an average. The cause of the deviation is probably to be found in the uncommonly great *general* mortality during the decennium 1769—1778.

the introduction of vaccination it stood at its minimum; and that it has since then again begun to increase. It is now increasing *in spite of vaccination*, just as formerly it decreased *although vaccination did not exist!* Whatever others may think of this, to us it seems that no conclusion can be more natural or more well grounded, than that small-pox, be the reason what it may, from the beginning of these returns up to 40 or 50 years ago, passed through a long period of decrease, and that it *looks* as if vaccination had exercised some influence in checking it, *because it happened to be introduced just when the disease then on its decrease was approaching its minimum.* If this were the case, it is very easy to explain how a general opinion in favour of vaccination arose and became prevalent, although the supposed influence was in reality only based on an illusion. When people saw that year after year small-pox decreased, and gradually almost entirely disappeared, and this took place contemporaneously with the more general application of vaccination, nothing was more natural than to suppose these two circumstances to stand to each other in the relation of cause to effect. It is an interesting question to be solved in the future, whether vaccination will not have to be entered on the list of the grand mistakes which have occurred in history, and in that case it would certainly be one of the strangest delusions by which men have ever been carried away. It may indeed be observed that during the decennium 1809—1818, the per-centage in

question diminished as much as 4 units, while the decrease during the whole of the foregoing periods taken together was only 7 units; but this latter diminution was a very considerable one; and is it not quite usual that epidemics, after having been on the decrease during a longer or a shorter time, suddenly disappear? However, on sifting still further the data given in Table A under the different years, it will be seen even more clearly that the diminution took place in a manner which is quite reconcilable with the idea of a gradual decrease.

A German author, Dr. Guttstadt, has just given us in a treatise entitled "*Die Pocken Epidemie in Preussen, insbesondere in Berlin, 1870—1872*" (*The Small-Pox Epidemic in Prussia, and more particularly in Berlin, 1870—1872*), though in a somewhat different way, some of the data relative to Sweden which we have been discussing above. He acknowledges that "the statements are such that every one who examines them cannot but receive the impression, and come to the conviction, that the mortality from small-pox has, during a long period of time, decreased in such a manner that accident as a cause thereof, is completely excluded. And no one can stand forth and give any other explanation, than that vaccination is the cause of the decrease of the mortality from small-pox." But in order to be at all admissible, the arguments of the author must apply to inoculation as well during the pre-vaccination period, as to the perfect insufficiency of which reason, there are

not two opinions, at least in Sweden; as we have already shown. It may be said if you do not accept vaccination as the cause of the diminished mortality from small-pox, then state some other cause, if this be possible! Well yes, if an explanation must necessarily be given. But you cannot for instance explain why small-pox has been so very virulent this year, and was so very slight last year. You cannot explain why measles or ague appear as an epidemic one year, and the next year almost entirely disappear. Upon the whole the rise, duration, and disappearance of epidemics cannot be explained; and why should you claim that we should be able to give an explanation of small-pox in this respect? Ought we not rather for the present to content ourselves with the actual results which we derive from observation, and to abstain from all arbitrary explanations? And that the explanation in question must be considered arbitrary, cannot be denied by any one who sees things as they really are, and not only as he would wish them to be. On the other hand, as has already been observed, it is not unusual for epidemics after they have lasted for a longer or shorter time, gradually, also during a longer or shorter time, to decrease and eventually to die out, or at least almost so; and this often very suddenly, and always without any one being able to give a definite reason for it. This is exactly what we find with regard to small-pox, although the period of its decrease was longer than has been usual in other cases. Never-

theless, epidemics of long duration which have gradually disappeared cannot be said to be unheard of. If that which in our later statistical returns is called "nervous fever" corresponds to what in the earlier table was called "spotted fever," this form of disease also, which according to Table C raged during a very long period with even greater violence than small-pox, has during the later decades considerably decreased, without their being any checking influence to point to such as vaccination is supposed to have exercised over small-pox; and it is difficult to see therefore why small-pox may not in like manner have diminished to what it now is, independently of such influence. But as there may possibly be mistakes in the earlier returns in respect to the diagnosis of the diseases, this comparison is not quite to be depended upon.*

* It would be interesting to know how matters stood with regard to small-pox at a remoter period than the one to which these returns refer; but in such records as we have been able to examine we have not been fortunate enough to discover any statements of details which have value as regards our purpose, except in a statistical treatise concerning the town of Vesterås, by Hülphers, given in the "Transactions of the Royal Academy of Sciences for the year 1773;" and which contains with few exceptions all matters relating to the population and mortality from the year 1623. It states among other things, what epidemics caused the increased mortality of certain years, as for instance "the plague" during the years 1623, 1630, 1652, 1653, 1710, 1711; "severe dysentery" in 1639; "the years from 1691 to 1698 were mostly very unhealthy, the two last caused by failure of crops and high prices;"

That the increase that has taken place latterly cannot be ascribed to any decline in the interest taken in vaccination, will be seen by the returns given below, which show that the per-centage of vaccinated persons in proportion to the number of births, has upon the whole been steadily increasing.

It is true that since it has been proved that small-pox epidemics break out in spite of vaccination, the re-vaccination theory has been pretty generally adopted; but as in reference to this there are but very few statistical data in Sweden, we shall not dwell upon it, our plan being to base our arguments upon Swedish experience exclusively,* and also because it is of no importance with respect to the essential point of our argument, which is of course *the decline of small-pox during the pre-vaccination period*. That this decline cannot either be ascribed to the influence of inoculation, must be evident to any one who has paid attention to the short sketch of the history of inoculation in our country given above.

Now let us take a short survey of what we have just been discussing. We have endeavoured to prove by figures :

“ Small-pox and dysentery were the alternate causes of the increased death-rate in 1736 and some of the following years.” Small-pox is thus not named as having specially caused the unusual death-rate during these latter years.

* In the sequel we shall, however, touch cursorily upon this question.

- (a) That the great mortality in the first year of life during the pre-vaccination period did *not* result (except in an inconsiderable degree) from small-pox, and, therefore, did not result from the absence of vaccination ;
- (b) That neither the general mortality, nor the special mortality from small-pox in infancy during the pre-vaccination period, is such as it would probably have been, had it resulted from the absence of vaccination ;
- (c) That the mortality from small-pox has shown a *decrease during the pre-vaccination period*, and an *increase during the latest decennium*, which can only be regarded as a consequence of the unknown laws which govern the rise and spread of this disease, but which cannot by any show of reason be brought into connection with vaccination ;
- (d) And that, without doing the least violence to the general statistical facts, but on the contrary in the closest accordance with them, the assumed influence of vaccination on the arrest of small-pox may be considered, and with every appearance of truth, as a perfect *illusion*.

Now do these figures deceive us, or are we deceiving ourselves as to the conclusions which seem to us to flow from them ? We do not wish to take up too positive a position in respect to a question on

which we have, we know, an almost unanimous opinion against us ; but so much we will allow ourselves to say, that if any one maintains, in spite of these figures, and the conclusions drawn from them, that it is *certain* that vaccination was the true cause of the decline of small-pox during the earlier part of this century, we think that in so doing he oversteps the lawful limits of sound logic, at least as far as concerns the state of things in *Sweden*. And, however strong our conviction may be, we desire no better than to take up this position, which is quite sufficient for our special purpose, as it undoubtedly devolves upon those who defend compulsory vaccination, to bring forward *positive proof* in the case ; for to base *penal laws* on a mere hypothesis, against which well-founded objections may be raised, is more than any one has a right to do.

In the foregoing pages we have endeavoured to show that the *general death-rate* did not decrease in consequence of the introduction of vaccination ; and now we have shown that the *mortality from small-pox* has not declined owing to *this* cause. The former fact alone, if it be correct, is a quite sufficient reason for the abolition of compulsory vaccination ; the latter, assuming it likewise to be well established, makes the compulsion, not only a legislative act without a motive, but reduces it to an absurdity. We leave it to the reader, that is to say, to the unprejudiced reader, to pronounce judgment.

And herewith we go over to another question

which we do not touch upon without some hesitation. As long as we had to move within the domain of general statistics, we felt that we had at least firm ground to stand upon ; but as we now intend, though merely cursorily, to consider the *medical* side of the question, we have not only everything to fear from our own ignorance, but we see before us, while seeking for some fixed points of departure for our arguments, nothing but chaos and confusion. In consequence, we shall almost entirely limit ourselves to the expression of doubts and the raising of questions. But from the negative standpoint which we have upon the whole assumed, and have indeed been obliged to assume, with a view to our principal question, even these doubts and questionings may prove not to be without some value towards the formation of a correct judgment of the matter. The question which it is most important to answer is this: *Are the foregoing conclusions, drawn from general statistical data, affirmed, or contradicted, by the conclusions drawn from medical and individual experience in Sweden?*

We are fully persuaded that there is not a theological dogma which in our country commands so unanimous an approval as does the prevailing theory of vaccination. With very few exceptions medical men and laymen believe in the power and beneficent influence of vaccine as an incontrovertible truth, which cannot reasonably be questioned, and scarcely

ought to be.* Under these circumstances it may seem venturesome to put forward any doubt on the subject; but we know too well the scientific spirit which generally prevails in the enlightened medical profession of this country, to allow ourselves to fear that it will receive otherwise than with a friendly feeling (and we hope also with indulgence to our shortcomings) this attempt to throw some light upon a question which is of great practical importance, and for the full solution of which even those persons who are most convinced of the correctness of the prevalent theory will hardly fail to allow, that all desirable reasons and proofs have not yet been produced. And no one who desires that with regard to science, truth, and truth only, shall prevail, can take amiss the expression of divergent opinions which rest upon objective grounds, and conclusions drawn from these.

At all events, we venture to hope that no prejudice or preconceived opinion will prevent an unbiassed consideration of the reasons for the opinion held by us, and which we are about to state. If it can be shown that the facts to which we refer have been misunderstood by us, or that the conclusions we draw from them are incorrect, we shall be most willing to acknowledge our error.

Considering that vaccination has succeeded in gaining the approval of the medical authorities,

* See, for instance, the publication V. T. F., repeatedly referred to in this pamphlet.

that the government has encouraged it in various ways,* that it has not only been made obligatory, but that it is performed gratuitously ; that public vaccinators (usually parish clerks or midwives) have been appointed in every community in the kingdom—that vaccination has been made a necessary condition for admission into the educational institutions in the State, and that in general the certificate of vaccination constitutes an element in the testimonial given by the clergyman to every child on leaving school, of almost equal weight and dignity with that of the baptismal and confirmation certificate—in a word, considering that vaccination has become a special object of care in the first place to government, and in the second place not only to the medical but also to the civil and ecclesiastical authorities, as likewise to the communal boards, there is not much reason to wonder that it should have gained such a firm footing in public opinion, or that it should be so widely practised as to gain for Sweden the honour of being called (as we have seen it named in a foreign publication on the subject) “the best vaccinated country in the world.”

Nevertheless, it cannot be denied that during the first year after its introduction vaccination met with severe resistance. In a letter from the Medical Board to the King, in 1810, complaint is made that on the one side “the public in Sweden do not in all places

* During the years 1851 to 1860 rewards for zeal in performing vaccination were bestowed upon 1332 persons.

manifest the care and zeal which one might expect from sensible and tender parents in applying for, or even allowing to be applied, this precious means of salvation from destruction of their children's good looks and future health;" and on the other hand, "instances occur in which vaccination is not performed by the persons to whom it is entrusted, with the judgment and particularity which are essential." In the year 1814 the same Board writes that "several of the Bishops who take the deepest interest in the spread of vaccination, have expressed their conviction that certain well-considered penalties have become as necessary as regards the ignorant masses, as encouragements would be useful," and as late as the year 1815, consequently the year before the issue of the vaccination law, the College complains of "sluggishness and indifference among the less-enlightened classes."

It is well known that in our country, from early times, the practice of medicine has not been foreign to the clergy, and it is therefore not surprising that the clergy should take a great interest in such a matter as vaccination. It may be alleged with certainty that had it not been for their very active support, its progress among the people would not have been as great as it has been. Archbishop Lindblom, among others, was very zealous in promoting vaccination in his diocese, and from a correspondence, during the years 1807—1811, between the Consistory of Upsala and the Medical Board, which was submitted to the King, it seems as if the clerical and

medical authorities had commenced a regular competition as to who should do the most within the domain of vaccination. The Consistory complains, partly that the rewards for zeal in the matter of vaccination were given more largely to medical men than to the deserving clergy, partly it finds fault with the order issued through the influence of the Medical Board, that no one who was not a medical man should have the right to perform vaccination, unless he could produce a certificate of capacity from a duly-licensed physician; the Consistory expressing the opinion that it would be far better to retain the experienced vaccinators already existing, without examination, to which, indeed, they neither would nor could subject themselves. "In that case," adds the Consistory, "we should not have seen what we have now much reason to deplore, that in certain districts of the diocese the unfortunate attempts of certain medical officials have so alarmed the people with regard to vaccination, that but very few individuals in those places can be persuaded to avail themselves of the prophylactic."

To this the Medical Board says in its answer, that "the Board was aware that a few medical men had in the beginning made mistakes between real and spurious vaccine matter, and that small-pox had supervened after the use of the latter. But such cases were not difficult to detect among officials who were under the supervision of the Board, whereas it was

impossible to discover what took place among the number of unreliable vaccinators, who, not being subject to any responsibility, take upon themselves so delicate and so important a calling; and that in respect of such vaccinators it was easy to assert, but not so easy to prove, that the operation had never failed in their hands." That these expressions, on the part of the Board, are not to be taken as evidence of any objection to the interference of the clergy in the matter, is proved by several circumstances, and among others, by the opinion enunciated by the Board, in the same year, 1811, that "if the members of the clergy who have specially distinguished themselves in this respect could thereby establish a legal preference to nomination to vacant livings and appointments, the College would consider such a measure as very conducive to the spread of vaccination." If no "legal" measure followed this hint, it is at all events not impossible that the opinion of the Board in some cases bore its fruits. In how far, from the scientific point of view, this alliance between theology and medicine has been of use in the question of vaccination, or if it has not in some measure been detrimental to the scientific investigation of the matter, by fostering and supporting in public opinion a vaccinal orthodoxy, we leave undecided; but it is evident from what has been said above about the interference of the Bishops in the matter, that the project of *penal legislation* (in the present case for the *salvation of bodies*) was at that time embraced with favour.

As regards the effect of these endeavours towards the spread of vaccination, the Medical Board states under date 1811, that according to returns received, about 8500 persons were vaccinated in 1809, but that the Board had reason to believe that in reality the number of the vaccinated was far greater.*

In the year 1814, the Board expresses its "hope of being able thenceforward to give accurate annual returns as to the number of vaccinated persons, which until then had been impossible;" and in the subsequent annual reports, we find that in 1815, the number stated was about 50,000; in 1816, about 60,000; but in 1818, only 49,711, and in 1819, still less, viz., 45,764 (in consequence of the absence of the returns from Vesternorrland, Norrbotten, and Öland). Now if we assume 10,000 persons to have been vaccinated in 1809, and 55,000 in 1818, we may, for want of more complete returns, and without doing any injustice to vaccination, take the average number 32,500 as representing the state of vaccination during the period from 1809 to 1818, which we have above designated as a transition period. This number, 32,500 is no more than about forty per cent. of the average number of births in the year during

* The returns for the archbishopric show that from the year 1804, to the end of 1810, no less than 33,298 persons were vaccinated; of these 7025 were vaccinated by clergymen, 20000 by officials connected with the churches, and 6273 by medical men and others. The last-named number, however, is considered too low.

the same decade. If to this we add that vaccination is principally performed on children, and far more rarely upon older persons, so that we may suppose that almost the whole of the grown up generation of the time was unvaccinated, and if we further take into consideration the probable results of the incompetency of many of the vaccinators, it is difficult for any unprejudiced person, or for any one who, as a general rule, wishes to discover a reasonable relation between cause and effect, to explain by vaccination the decrease of the mortality from small-pox which took place during that decennium. The number of deaths during that period had in reality gone down to 685, from 3276 during the immediately preceding decennium, thus showing a decrease of not less than eighty per cent. We ask if it is reasonable herein to trace cause and effect? It is true it may be said—and we have seen the observation made somewhere—that the protection of vaccination extends further than can be judged from the merely numerical value of the per-centage of vaccination, because even on a small scale, it serves to destroy the foci of contagion, from which the epidemic might spread further. But it is exactly with regard to the infectiousness of the disease that it seems to us the *six*-tenths of the unvaccinated ought to exercise a greater influence than the *four*-tenths of the vaccinated, and that consequently it is by no means clear how the good results could *exceed* the numerical proportion; at least unless they had succeeded in especially applying vacci-

nation to the lower strata of society, that is to say, to the very poorest classes, where the contagion of small-pox always has had, and still has, its principal stronghold. But to suppose this, would be (as we shall show in the sequel, and as the experience of the present day teaches us) to suppose exactly the reverse of the true state of things.

We can just as little explain, satisfactorily, by means of vaccination, the difference, though a much smaller one, which took place between the decennium 1789—1798 and 1799—1808, which amounts to 627, or about one-sixth. If even we suppose for the period 1801—1808, an annual number of 5000 vaccinated cases (which seems to be far too high), *i.e.*, an average of 4000 for the whole decennium, this nevertheless only amounts to one-twelfth of the annual number of births ; so that if we further consider on the one hand, that the older generation probably on the whole remained unvaccinated, and on the other hand, that vaccination in the beginning was more particularly adopted by the wealthier classes of the community, it seems to us uncommonly difficult in this case also to find any proportion between the cause and the effect.

What we have here stated, becomes still more evident on an examination of the numerical returns in Table A for special years. We find from these that the principal decrease took place so early in the decennium 1809—1818, that, according to the information previously given as to the spread of vacci-

nation up to that time, it is impossible to explain this decrease as being an effect of vaccination, without overstepping the limits of permissible supposition as regards a natural agent: and further we cannot go in this matter.

But, whatever the truth may be, a strong public opinion has been formed in favour of the protection theory, and vaccination has spread more and more. In reality, we find from the official statistics of Sweden, that the per-centage of annual vaccinations in proportion to the number of births during the year immediately preceding the period mentioned below, has upon an average been :—

Table M.

In the five years.	Per-centage of vaccinated cases.
1816—1820	70 per cent.
1821—1825	74 "
1826—1830	68 "
1831—1835	73 "
1836—1840	77 "
1841—1845	74 "
1846—1850	79 "
1851—1855	81 "
1856—1860	80 "
1860—1865	76 "
1866—1870	*72 "

* The apparent decline during the later years may be explained by the considerable fluctuations in the numbers of births during that period.

Whereby it has to be observed that the average returns for the different districts varied, for the years 1851—1860, from 70.5 per cent. to 93.6 per cent. Upon the whole it may be assumed that near upon 80 per cent. of the children born are vaccinated. This is as much as saying that vaccination is general, when we take into consideration that the legal term for vaccination includes the two first years of life, while, as we know, a considerable number of children die during the first year of life, and of these about one-half during the first three months. As a rule prescribes that no unvaccinated child can be received into the schools of the State, we may take it for granted that among the better classes of the community who have any claim to admission, or any expectation of obtaining it for their sons, into these schools, vaccination must in the strictest sense of the word be general, no exception in the matter of vaccination being made with regard to daughters; and how far down in our country the desire for a higher education goes, is well known to all. In the popular schools vaccination has not, up to the present day, as far as we know, been made a condition of admission, in order not to place an obstacle in the way of general attendance at school. But even in this case it is likely to become more usual. The respect for the law which in general characterizes the lower, as well as the higher, classes of our people, has also contributed largely to the very successful introduction of vaccination, so that it may with justice be supposed that, with very few exceptions, and that only among the

lowest, poorest, and in every way most degraded classes, no omissions in this matter occur.

According to the official returns, the towns, however, seem to form exceptions to this rule, and particularly Stockholm, the per-centage of vaccination in which city is stated at only about 45 per cent. of the population. This number is, however, considered too low, partly because in Stockholm a proportionately greater number of children die before they can be vaccinated, and partly because in the cases in which vaccination is performed by the medical attendants of the family, and not by the public vaccinators, it is very likely that the returns are not made with the same regularity. But whatever may be the influence which these two circumstances exercise, it must be admitted that vaccination seems far less general in the capital than in the country. To those who know the condition of the poorer classes in Sweden, as regards morals, modes of life, and views in general, in the country as well as in the towns, and particularly in the capital, this will not seem strange. We shall, in the sequel, touch further on this special question. For the rest, it appears that vaccination has sometimes been useful for other objects than being a preservative against small-pox, as, for instance, when one vaccinator states that "during twelve years that he has vaccinated, he has four times succeeded in vaccinating away birth marks and defects in children."*

* See Report of the Medical Board.

As of late vaccination has been considered less efficient as a prophylactic against small-pox than formerly, and re-vaccination has begun to be urgently advocated, this also, though not yet made obligatory, is practised more or less generally, and during the prevalence of epidemics is more particularly had recourse to, but not to an extent at all comparable with the vaccination of infants. Indeed, in the official reports at least, the number of cases of re-vaccination given is comparatively very small. In some places, however, the zeal shown has been very great. Sometimes they have even gone so far as to apply re-vaccination to little children of from two to five years old, notwithstanding their having distinct marks of previous vaccination. In one case we have found that a troop of recruits, in another, that a flock of school-boys, were re-vaccinated, *en masse*, and in several cases that the young people being prepared for confirmation, "were subjected to re-vaccination."

From the point of view from which we are here looking at the subject, we cannot but deplore these proceedings, however well meant they may be. As the law does not prescribe re-vaccination, but leaves it to every one's own judgment, it can hardly be considered otherwise than as a violation of individual freedom, that persons possessing the authority that an officer exercises over soldiers, and a master over pupils, should avail themselves of this to enforce re-vaccination on their subordinates, even if it should be done with greater delicacy than is expressed in the

words "were subjected to;" and more particularly when people allow themselves to administer vaccination to children being prepared for confirmation, this must be deemed a mixing up of heterogeneous subjects, which is in the highest degree indecent.

As regards the direct medical effect of vaccination or re-vaccination in affording protection against small-pox in special cases, very little satisfactory information is contained in the sources from which we have drawn, these being principally the Reports of the Royal Sanitary Board. In the reports of provincial doctors and vaccinators, we often meet with such general statements as that vaccination or re-vaccination has proved very beneficial in preventing an epidemic, or that it has been principally the unvaccinated among those attacked (more especially unvaccinated children), whose cases have had an unfortunate issue; but definite statements from which well-grounded conclusions could be drawn were entirely wanting. It almost looks as if the vaccination theory from the very beginning was considered as so indubitably true, that it needed no further confirmation. It is possible that there may elsewhere be found more satisfactory observations on the subject, though we have sought for them in vain.* The only returns of any more special interest which we have

* As in the periodical V. T. F. only foreign experience is quoted, there is some reason to suppose that no records of Swedish experiences exist on the subject, or, at least, that none have been made public.

been able to discover have been made by the small-pox hospital in Stockholm, of which we shall say more below. That, however, neither the fact of having had small-pox, or of having been vaccinated, or re-vaccinated, constitutes any *absolute* protection against small-pox, or against death from the disease, is mentioned in several places. As an example, I may state that from one place it is reported that two brothers who had both had natural small-pox, at a subsequent period died from this disease. Another person was mentioned who, at the age of fifty-one, died from small-pox after having been vaccinated five different times, "though always without any result," &c. Indeed, this seems to be a very common occurrence as regards re-vaccination, which only "takes" in about half the number of cases operated upon. In about 8000 cases which we have noticed, re-vaccination has, on an average, taken effect on fifty per cent.; but this has varied very much in special cases.* It is further to be remarked with regard to this point, that those in whom the vaccine takes effect consider themselves as protected; and, on the other hand, those in whom it does not take effect consider themselves as not being receptive of the contagion. This opinion was embraced by the Swedish author whom we have several times quoted. A German author, whom we have also quoted, says, on the contrary,

* It is stated in V. T. F. that in the Prussian army re-vaccination was successful in "more than half the cases."

that "the theory that no elements of disease are present when re-vaccination leads to no results, seems incapable of being maintained. * * * * *

The most experienced vaccinators consider that only when there is a result from re-vaccination is there any guarantee for protection." If this last quoted opinion is the conclusion which the science of our day has come to on this question, in what light is the vaccinator and his art looked upon by those who are calmly satisfied with one *opus operatum*, never mind what be the result? And if, according to the above-mentioned German opinion, and the Swedish (and also German) experience of re-vaccination previously alluded to, there are a number of persons (about fifty per cent. of all) who are *accessible to the contagion*, but *not accessible to the means of protection*, what is, then, this supposed means of protection other than self-delusion, at least for all others than the elect? And if uncertainty exists with respect to so fundamental a question as this, what reasonable motive can there be for the introduction of compulsory re-vaccination, which is now urgently advocated among us?

The returns given in the reports alluded to mostly refer to the number of the sick and the dead, without distinguishing between the vaccinated and the unvaccinated. The per-centage of deaths has varied very much. The average in about 50,000 cases noticed by us, amounts to 12.5 per cent.; but often the mortality has been very small, while at other

times—for instance, during the present epidemic in Stockholm—it has amounted to from twenty to twenty-five per cent.* These returns might be of greater interest than they actually are, if we possessed similar returns from earlier times with which to compare them, as in that case we should be able to ascertain whether any important change has taken place in the intensity of the disease. Failing these means of comparison, returns are of little value, more especially with regard to the question which it is our special object to solve. We therefore proceed with observations which have been made in the small-pox hospital in Stockholm, the only ones that afford a starting point for arguments, although even these observations are very incomplete.

The following are the returns suitable for our purpose, which we have found in the reports of the sanitary department.† They all refer to the hospital named above.

* The report of the first district physician in Stockholm, dated April 18, 1874, comprises, since the beginning of the epidemic, 3173 cases, and 646 deaths; but during the earlier stages of the epidemic the mortality was greater.

† Those returns which merely give the number of sick and dead, or which merely mention that so-and-so many of the cases were vaccinated, without subsequently noting separately the per-centage of deaths among the vaccinated and the unvaccinated, we have not been able to turn to any account.

Table N.

YEAR.	VACCINATED.		UNVACCINATED.		UNCERTAIN IF VACCINATED.	
	Sick.	Deaths.	Sick.	Deaths.	Sick.	Deaths.
1852	133	11	41	11	—	—
1854	55	5	7	2	1	—
1857	968	122	58	23	78	27
1858	239	17	9	2	23	14
1859	260	23	10	2	10	3
1860	77	5	9	2	31	3
Total	1,732	183	134	42	143	47

These numbers show, that of

1732 *vaccinated* cases, 183, or 10.36 per cent. died.

134 *unvaccinated* „ 42, „ 31.34 „ „

143 *uncertain*, 47, or 32.86 per cent. died.

And it is generally considered that these numbers prove the usefulness of vaccination. In reality, even if we take the number of cases in the third category as belonging to the vaccinated, the per-centage of deaths among the latter would only be increased by two or three units, so that in every case the per-centage of deaths among the unvaccinated is shown to be almost three times as great as among the vaccinated.

However, if we look more closely at the subject, we shall see how easy it is to draw a precipitate conclusion with regard to this matter. In the first place, it may be assumed that the number of cases, more especially as regards the unvaccinated, is far too small to found a sound judgment upon, particularly if,

as we have been assured by persons of experience, it is not easy in every case to avoid mistakes in classing a patient in one or other of the categories named. This, however, we state merely *en passant*, and we take the numbers as they are. But we must, on the other hand, lay much stress on another circumstance, which is of the greatest importance with regard to the value and significance of the returns. Are the cases entered in the rubric "vaccinated" only such as have been but *once* vaccinated, even though they be of an age when they ought, according to the theory, to require re-vaccination? The whole weight of this question will at once be seen. If the necessity of re-vaccination after a certain lapse of time—say, for instance, ten years—is assumed, and it be thus granted that the original vaccination loses its effect after ten years, then all patients who are above ten years, if they were vaccinated as children, must actually be regarded as "unvaccinated;" and if, therefore, as is very likely, they are, on account of the vaccination marks found upon them, considered as vaccinated, then it is quite possible that they contribute very considerably, though very unjustly, to the results in favour of vaccination appearing in the returns. Let us see what is the logic of this. Caius gets the small-pox, and recovers: no wonder, it is said, for Caius was vaccinated. But Caius gets the small-pox and dies: no wonder, it is again said, for Caius had neglected to have himself re-vaccinated. Whatever happens, vaccination must be right. It is

to be hoped that the parties concerned have not been guilty of such a very serious mistake as regards the returns of medical practitioners, and the conclusions that may be drawn from them. But in general this objection is of so serious a nature, that it is very difficult to say how any reliable conclusions can be drawn from medical practice, as long as it is not decided either after the lapse of how long a time re-vaccination ought to be performed, or whether this time is the same for all individuals. These difficulties did not exist as long as people were contented with the vaccination theory alone. Since the introduction of the re-vaccination theory, the whole matter has become hopelessly involved.

There is another circumstance which is equally deserving of attention. We have endeavoured in the previous pages to show the probability (and we believe that it can hardly be denied) that it is essentially among the lowest and poorest classes that the unvaccinated cases are to be found. But the hospital is recruited exclusively from the poorer classes, and it is thus, most likely, according to what has just been said, that the "unvaccinated" category consists of persons belonging in every respect to the lowest classes of the community. Now if it be the needy, the dirty, the disorderly, the immoral, who especially represent the "unvaccinated," how can we for a moment be surprised that the mortality in the case of small-pox (or whatever other disease it may be) should be greater among persons of this kind than among

the well-to-do, or, at least, less indigent classes? And when so much is said about the great mortality among "unvaccinated children," has the amount of vitality been taken into account which, independently of any question of vaccination or non-vaccination, is likely to be found among these unhappy children of vice and want, with their constitutional weaknesses and their constitutional tendency to disease? Is it necessary, in order to explain the greater mortality among such individuals, to seek for any other reasons than simply those that have just been stated? It is evident, that as long as these circumstances are not taken into consideration, as long as it cannot be demonstrated that the vaccinated and the unvaccinated are under the same conditions with regard to these matters, the numbers in question in reality prove nothing. This circumstance renders the investigations so much more difficult, that we cannot, without great hesitation, accept the returns which are made, be it by the hospital, or by private medical practitioners; and unless a great number of observations can be made with perfect impartiality in the case of patients whose position in life is at least tolerably equal, it will be quite impossible to draw any conclusions worthy of confidence. The remarks which one often hears made, either for or against vaccination, be it by professional men or laymen, speaking from their individual experience, are generally of such a character, that no one who has an idea of what *proof* means, can look upon them as proved.

We will, however, go back to the hospital returns we have had under consideration, in order to ascertain their arithmetical significance from some other points of view. The following circumstance deserves first of all our attention. If we admit into our calculation only those cases which are returned *decidedly* as vaccinated or un-vaccinated, we find that of the total number of patients, amounting to 1866, no less than 1732, or about 93 per cent., are vaccinated. But according to what we have said before (page 72) only about 45 per cent. of the children born in Stockholm are vaccinated; yet that this comparatively low percentage of vaccinations in Stockholm must chiefly be applicable to the lower classes, among whom the patients of the hospital are recruited, is very clear. Although the reports of the private practitioners are rather incomplete, they hardly touch the class which we are here referring to; and when we thus limit the investigation to the poorer or the poorest classes, i.e., the classes which chiefly have recourse to the hospital, it seems difficult not to admit the correctness of the numbers in the official returns. Now we know (see page 71) that as regards the whole kingdom, almost 80 per cent. of the children born annually are vaccinated. And if we ask what percentage of the *entire population* at any given moment is vaccinated, the answer cannot possibly be as great as $\frac{5}{4} \times 80$, for this would pre-suppose that in the strictest sense all are vaccinated, which is not the fact. If then, for the same reasons, we multiply the 45 per

cent. given above with $\frac{5}{4}$, we get the quotient 56 per cent. This ought, as regards the poorer classes of the population in Stockholm, to amount to more and not to less than the true per-centage of the vaccinated in proportion to the whole population, but in our calculation it must stand as such. In that case there ought to be among 1866 persons belonging to these classes, 1045 vaccinated and 821 unvaccinated. The same proportion ought to have existed among the patients in the hospital who came from these very classes, so that instead of 1732 vaccinated, there ought to have been only 1045, while on the other hand instead of 134 unvaccinated, there ought to have been 821. This difference can only be explained in two ways, viz., either a larger number than the correct one has been returned by the hospital as vaccinated (which is difficult to believe in opposition to the statements of the hospital doctors), or the probability of being taken to the hospital is greater in the case of the vaccinated than of the unvaccinated. Now if there be not as regards this last-named circumstance some arbitrary election, what we have said can only mean that the probability of taking small-pox is greatest among the vaccinated. This again would lead us to the final conclusion that the probability of taking small-pox is greatest among the vaccinated, but that the probability of dying of small-pox, when once taken, is greater among the unvaccinated. If this be so, what is the eventual use of

vaccination? If any one, for instance, being unvaccinated, has three chances to one of dying in case he takes small-pox, but on the other hand has three chances to one of entirely escaping from small-pox, then the chances are perfectly equal whether he be vaccinated or not. And in effect we see from the numbers quoted that there were in the hospital twice as many vaccinated cases, and one-sixth less of unvaccinated, than we had reason to expect. Even this question is not yet decided—nor can it be so by the notices which we have here referred to. As for ourselves we merely quote the returns, and make our calculations here, as also in the sequel, not to *prove* anything, but only to *show* that the whole of this matter is so chaotic, and so confused, that it really is not possible to draw any conclusions which are likely to be even seemingly true.*

We now proceed to take into consideration another side of the subject. The reports of the workhouse doctors in Stockholm, for instance, for the year 1857, show that out of 1451 cases, 758 recovered, 526 were taken to the hospital, and 167 died. How many were vaccinated or unvaccinated is not mentioned; but according as we take for the basis of our calcula-

* If any one should be offended by the result we have come to, he must blame the official returns. We do not, however, overlook the fact that probably many of the cases received in the hospital had been brought in from the country, and that this must of course increase the per-centage of the vaccinated. But here we have another circumstance which contributes to leave us in uncertainty as regards the significance of the numbers. And so we go on.

tion either the per-centage of vaccinated cases as given above, or the per-centage derived from the cases in the hospital, we find that of the 1451 cases mentioned, either 813 or 1349 were vaccinated, and either 638 or 102 were unvaccinated; as also that either 295 or 489 vaccinated cases, and either 231 or 37 unvaccinated cases were taken to the hospital; while either 518 or 361 vaccinated, and 407 or 452 unvaccinated cases were nursed at home. Whether we proceed on the one assumption or the other, and whether we accept the one supposition or the other, in reference to the per-centage of deaths among the vaccinated or the unvaccinated cases being the same in the home as in the hospital, we find that by adding together the numbers in the home and in the hospital, we arrive at the most contradictory results; nay, we may indeed almost obtain any results that we like. Now what importance can properly be attributed to returns which leave room for such dissimilar interpretations? Is it not evident that there is nothing here which can afford a firm basis for sound argument? We will therefore not persist in so fruitless a labour, but instead take a retrospect of what lies behind us. We have seen in the preceding pages:

- (a) That the statistics, and the rest of the facts relating to vaccination in our country, do not allow us to consider the protection supposed to be afforded by vaccination, a *sufficient* ground for the explanation of the

decrease of small-pox during the transition period 1809-1818, or the years immediately preceding it ;

- (b) That, as a general rule, experience shows that neither the fact of having had small-pox naturally, nor vaccination, constitutes an absolute preventive against contagion, or against death from small-pox ;
- (c) That, as regards re-vaccination, the opinions entertained of it are so contradictory, and the results of the practice are so variable, that for this reason alone it seems very difficult to attribute to it any value as a means of prevention ;
- (d) That the statistical returns of the medical practitioners* are so incomplete that no definite conclusions can be drawn from them ;
- (e) That in general the best-founded objections may be raised against the bare returns of the relative mortality among the vaccinated and unvaccinated, considered as a proof for or against the usefulness of vaccination.

In consequence of all which circumstances it seems *very far from proved* that either vaccination, or re-vaccination, really possesses the prophylactic power attributed to them.

* We must remind the reader that we only know these returns as they are given in the reports of the Sanitary Board.

It is true that this last-named conclusion is only founded on an investigation of what Swedish experience teaches; and it is quite possible that foreign countries may be able to present a richer experience, and a more complete demonstration, which, should it be so, ought not of course to be overlooked. As for ourselves, we refrain, for reasons which we have already stated, from all reference to foreign experience, and more especially from any criticism of what has become known to us. Any one who has attentively read through, and reflected upon, the observations we have made above, will undoubtedly agree with us that a criticism of foreign observations and circumstances must be particularly difficult, when we see what difficulties we have to contend with in trying to get at the real state of things at home. And although the claims to scientific proof may be unequal, still we believe that certain foreign conclusions which have been quoted in some Swedish works as *proofs*, cannot be accepted as satisfactory, at least in the form in which they are laid before us.

Such being the state of things, we have seen with some surprise, in a recent publication, a proposal that *re-vaccination* should be made obligatory. "As long" (it is there said) "as we have compulsory communion, so long we ought also, in the interest of progress, to enact compulsory re-vaccination. Then no one ought to be admitted the first time,* without a certificate that re-vaccination had been

* Qy. to the communion?—original does not say.

performed, together with a statement of the results. That period of life would indeed be the most suitable, for at the age of fourteen or fifteen receptivity to contagion from small-pox in those who have been vaccinated in infancy begins to increase noticeably. A legal injunction concerning older individuals would no doubt be considered an unjustifiable interference with personal freedom.”*

We should have been less surprised at this remark if it had not been put forward under the ægis of V. T. F., and thus as expressing a claim which the science of the day is supposed to make, and has a right to make, on legislation. As for ourselves, we cannot believe that that which in this case is “considered an unjustifiable interference with personal freedom,” as regards *older* persons, can be allowed as regards *younger* persons. But even if it were so, can science, such as it is now, *i.e.*, based on the materials of observation which are at present at its command, and after a careful testing of these, really assert with any degree of truth that it *knows* what is the duration of the supposed influence of vaccination; or, in other words, how often re-vaccination ought to be performed, or if this duration is different in different persons; and so forth as to other circumstances which certainly it is important to take into consideration in connection with this matter? We much fear that *nothing* is known on the subject, that is to say, in the sense in which the science of our day understands the

* See V. T. F., page 28.

word to know. And, besides, ought the cultivator of science, whose only object should be the *discovery of truth*, to allow himself to be misled even by amiable philanthropic zeal to propose *compulsory measures*, however profoundly he may be convinced of the correctness of his theory? And how much less ought he to do so when this theory is so little protected against well-founded objections and doubts as is the theory of vaccination and re-vaccination?*

* Is the theory of re-vaccination in reality anything else than a new hypothesis in support of the old shaky hypothesis—an epicycle in the system? As long as there were no small-pox epidemics (or, according to what has been said in the previous pages, as long as small-pox during its decreasing period was at, or near, the minimum), vaccination was a protection. Since small-pox epidemics have again begun to appear (or since small-pox has entered on a period of increase), vaccination is no longer good, but must be followed by re-vaccination? Must not every one who reflects ever so little on the subject, see in this at least the *possibility* of a *quid pro quo*, of a confusion between causes and effects? For ourselves we confess that, wonderful as the doctrine of vaccination is in itself, it becomes still more wonderful through the theory of re-vaccination. And not satisfied with this theory as regards *time*, they have even a new theory as to the *mode of operation*, which consists in this, that the protection afforded is made dependent upon the number of punctures. This may be said to form an epicycle on the epicycle; and if this theory is correct, the doctrine of vaccination may be said to be almost indestructible, *whatever* form experience in the matter may actually present. For instance, if vaccination proves itself insufficient after ten years, then they can say that the time ought to be shortened to five years, and so on. However, there is a limit to this, for a person cannot well be vaccinated more than once a year, should it come to that. But as regards the number of punctures doctors may always appeal from a smaller number to a greater, namely

Are we not hereby reminded of how theological orthodoxy, as we have shown in the previous pages, at one time proposed and carried through measures, the nature of which we are now aware of, and the

in case a maximum be found, until this maximum is attained, which for practical reasons, would probably rarely happen. In the Prussian army, where everything is done thoroughly, they have already come not to be content with less than *twenty* punctures (see V. T. F., page 26.) We allow ourselves to ask only one question on this point. How is it, if this puncture theory be considered right, that, as far as we have learnt, our practical physicians have not, during the present epidemic, when performing re-vaccination, given the maximum of protection which can be afforded, but have been content with three or four punctures, as has been the case, we happen to know, in several instances? If the protecting power increases with the number of punctures, and *twenty* Prussian punctures are considered requisite for *full* protection, how great is the power of protection afforded by *three* Swedish punctures? According to the data given in V. T. F. three punctures correspond to a mortality of ten per cent., which is not much below what generally takes place *without re-vaccination* during a common epidemic, although it is only the half (or thereabouts) of the mortality during the present more severe epidemic. If there should be any lack of vaccine, it would not be without use to inform every person of the *degree* of protection which is given to him, so that no one may be rocked in the cradle of groundless expectations. Or is it that there is only a partial *belief* in the experience that is referred to, and which is, nevertheless, considered as affording important proof of the power of vaccine. Let us not be misunderstood. We do not blame science for not having found the solution of an insoluble question; but we should blame—and we believe with good reason—a man of science, if he were to enforce, by means of penal laws, a medical theory which, in reality, the physicians themselves did not believe, or did not practise.

essential defect in which was that they were founded on uncertain knowledge? Are we not reminded that about the year 1700 there were not wanting voices which advocated penal laws with regard to *inoculation*, which now in some countries is forbidden under *penalty*.^{*} Nor can we approve of bringing compulsory communion into the category. It is true that vaccination is, by a number of persons, considered as little less than a kind of medical sacrament; but it is too much opposed to the spirit of our times, particularly within the realm of science, to urge sacramental compulsion, be it medical or theological. To endeavour by spreading *enlightenment* and giving good advice, to be of use to humanity and the community, is without doubt the only thing that is compatible with the dignity of science in the present day. In a military state like Prussia *compulsion* may possibly be in its place; but here in Sweden we hope that neither school children, nor children coming to the communion, nor the youth who are liable to military service, will be made a field of experiment for the State lancet.

We have still, before concluding these statements, to touch upon one more point belonging to this part of our subject. The opponents of vaccination often assert that this operation is not only useless but decidedly injurious, by causing diseases, and sometimes even death; and it is allowed, we believe, even by the defenders of vaccination, that eventual syphilis

* At least this is the case in England and in Russia.

really can be communicated through vaccination, if the necessary caution is not observed.* We do not allow ourselves to pronounce any judgment in this matter, but so much we think we may say, that if only *one single* well-established case of syphilis has been found to be communicated through vaccination, this is a sufficient reason for the abolition of compulsory vaccination. Because when it is known—and this is generally allowed—what extraordinary difficulties lie in the way of the full and certain confirmation of such a fact, there is every reason to suspect, that this *one* case may, in reality, represent hundreds of cases. Under such circumstances, there is always, at least, reason to entertain a fear : a justifiable fear, as it is certainly better to die from small-pox, however horrible that complaint may be, than to live with syphilis, to the unutterable ruin of one's descendants in the third and fourth generation. Or, are the pictures, drawn by medical writers, of the terrible effects on the race of hereditary syphilis only a myth ? It is said, indeed, that there is no danger, as such unfortunate occurrences can only take place through the negligence of the vaccinators ; but ought any one to be *compelled* to submit to an operation the result of which *depends* on the skill and care of the operator ? Ought any one to be *compelled* to take poison, however useful it may possibly be when administered properly and in moderate doses, only because the physician is supposed not to administer

* See V. T. F., p. 32.

it otherwise than in the proper cases, and in moderate doses? Are there not examples of even distinguished physicians making mistakes? and are we in addition to this risk to be *compelled* in the cases we are referring to, to be content even with quacks? But this is exactly what takes place with regard to vaccination. Parish clerks, midwives, and sometimes, as we learn from the reports of the Sanitary Board, even “doctors’ boys,” or other incompetent persons, are intrusted with the performance of vaccination, and it is clear that an operation which is to extend to the whole nation, cannot otherwise than in many cases fall into the hands of incompetent persons. Under such circumstances, are there sufficient reasons to take for granted the insight and the scientific conscientiousness, in default of which it is allowed that the operation *may* be dangerous? And can any one with reason be compelled to submit to an eventually *dangerous* medicinal operation which is performed by “doctors’ boys?” Let it not be said in extenuation, that it is open to every one to apply to a competent physician, for the great mass of the nation must, at all events, be served by the subordinate vaccinators.

We express ourselves with much hesitation on a subject which we understand so little as this; but we nevertheless venture to think that there are good reasons for not regarding this subject in a spirit of levity and indifference, and that it ought by no means to be overlooked when there is a question, as in the

present case, of what the State has a right to command and decree. With still greater hesitation, we venture to express an opinion concerning the assertion made by many of those who are opposed to vaccination, that it brings with it many other evils, and more particularly that it is probably the cause of general debility as well as of special diseases of various kinds. Those who defend vaccination do indeed reply that these assertions have not been *proved*; and we believe that they are right therein. But may it not be said on the other side with equal truth that the *counter proposition*, i.e., the harmlessness of vaccination, has not either been *proved*? And may it not be said that in this case, at least, the presumption lies *against* vaccination? Or if the natural organism *be* receptive of the contagion of small-pox, but this receptivity is completely neutralized by vaccination, be it for the whole life-time, or for a period of ten years, or fifteen years, and so on; can this take place without the *natural* state of the organism being permanently *changed* in one way or another? And is there not reason at least to fear, that a change in the order of nature cannot take place without nature seeking to revenge herself for having been violated? May we not here apply very appropriately, "*Naturam expellas furcâ, tamen usque recurret?*" And may there not therefore be reason to fear that that which is considered useful from one point of view, may from another be injurious?

Further, if it be not a *natural*, but a certain con-

genital morbid tendency in the organism, which is destroyed by vaccination (so that vaccination, in fact, restores the organism to its natural *esse* !), then, as vaccination is to be made obligatory to every one, it must be proved from a medical point of view that all human beings are born with this morbid tendency, which it is certainly not easy to show. For in the contrary case, if Peter is to be vaccinated, and to be exposed to the accidents that may follow vaccination, because Paul is to be saved from the contagion of small-pox ; this would be a vicarious satisfaction, of the justice of which it would be difficult to convince us on any scientific or political grounds.

In every case it is impossible not to be struck by the inexplicable and miraculous character of an operation which in so strange a way changes the organism (otherwise so easily exposed to variations) for the whole lifetime, or for ten years, or for fifteen years, or more, that neither mode of life, nor any outward circumstances, have power any more to make any disturbance in this organism ; for if it be supposed that this can take place, then nothing remains but to let oneself be vaccinated every day in the year, in order to be quite secure ! Is not, in fact, everything here chaos and obscurity ? And how should it be otherwise ? Nobody can say what the small-pox contagion really is. No one can say what vaccine is. No one can say what takes place through vaccination. The vaccinator does not know what he is doing ; he is walking in the dark. And

this comprises everything that need be said in the case ; for neither from a scientific nor a political point of view can it be justifiable *to found penal laws on what we do not know*. Under such circumstances it may beseem the man of science, as well as the statesman, to *give advice* if he sees good reason for so doing, but not to *enforce* his advice by *external power*. A man may according to his convictions advise vaccination, or advise re-vaccination, but let him hold his hand from compulsory vaccination laws. It is only against the latter, which we consider to be an abuse of the power of science, and of the power of the State, and as derogatory to both, that we have desired to express our objections, and we venture to believe that whoever properly weighs what has been said in the preceding pages will not be able to challenge the justice of these objections. Lastly, it must not either be overlooked how, even from the point of view of vaccination, every advantage is to be obtained through freedom. Let it be remembered that already during the time when vaccination, though introduced into the kingdom, had not yet been made obligatory, the deaths from small-pox had gone down to about the average at which they have remained ever since (see page 27.) As for ourselves we are indeed inclined to attribute this to very different causes, but the advocates of vaccination must undoubtedly attribute it to vaccination ; and in that case what has been the good of the penal statute ? All the advantage that could be gained had already been obtained

under the voluntary system, and why not persist in the same course? The inconveniences of not having done this are evident. For the first it is but too well known that when a theory is elevated into law, this irresistibly acts as a check on investigation. The experience of all time bears witness to this—and is there not reason to suspect that this experience is borne out by the present case also? It is more than seventy years since vaccination was introduced into the country, and how little is yet known about it! Is it not likely that if vaccination had been free, matters would have been different, particularly during the last ten years, when medical research has made such great steps forward in a truly scientific spirit. Or have we really in this case escaped the injurious influence of an orthodoxy?

To this must further be added the practical inconveniences of the unlimited belief in vaccination which are a consequence of its legalization. In reality, when a small-pox epidemic breaks out, and vaccination alone is called for with all might as the only means of salvation, it is clear that, because of the mysteriousness of this operation, the first effects on most minds must be a kind of panic fear. People go to the vaccinator with about the same feeling as the faithful who expect help from the direct intervention of heaven go to the shrine of the saint. But in the next moment this feeling gives place to another. As soon as they have been touched with the lancet, and have received the miraculous means

of protection, they, like the faithful who have obtained amulets, give themselves up at once to a feeling of security, which is the opposite extreme. And then they neglect to observe all those precautionary measures as to mode of life, cleanliness, ventilation, &c., which both in general, and also specially with regard to contagion in small-pox, probably exercise as much influence as any purely medicinal precaution, or curative measures. Every one will easily see how injurious both these states of mind may be during an epidemic.

But to come back to the starting-point of our theme. Such is the result which must always be expected when penal measures are adopted in un-called-for directions, or wherever the legislator is not supported by sure and well-established truth. And thus the vaccination question may, as we have intimated from the outset, as well through its origin, as through its nature and its consequences, serve as a cardinal instance to throw light upon the great rule as to the relation between legislation and science, which we have endeavoured in these pages to establish.

Up to this moment we have considered vaccination only as a thing in itself, as an isolated hygiènic measure, the effect of which it was our object to ascertain, without in so doing making any reference to the theory which lies at the very foundation of the doctrine of vaccination, and which we will now take under review. It has been necessary to proceed in this manner in order that the reader might first of

all convince himself in how far vaccination as *such* has exercised all the influence which is attributed to it. Having now produced the reasons and proofs which in this matter are at our command, we proceed to look at vaccination from this theoretical point of view.

It is thought that vaccination, in the first instance, is to be regarded as a vicarious substitute for small-pox—in other words, that the protection afforded by vaccination has for its object to take the place of that protection which is supposed to be afforded by having once had natural small-pox; and it is therefore of interest to inquire into the nature and quality of this latter protection. Before we go further we ought, however, to call attention to the fact, that the doctrine of vaccination, considered from this point of view, necessitates two suppositions: the one, that there is really something prophylactic in having once had small-pox; the other, that vaccination has in this respect really the same effect as small-pox. We fear that neither the one nor the other can be *proved*.

As regards the first-named proposition, it is based upon an observation which we believe to be quite correct, viz., that it is only in exceptional cases that any one who has had natural small-pox once, again becomes subject to the disease. But however correct this observation may be, nevertheless the opinion based upon it is so far from being *proved*, that, on the contrary, it can hardly be ascribed to anything more than a confusion of ideas. It may be *said*, it is true, as most people do say, that there is some-

thing prophylactic in having had small-pox once ; but in so saying, are they not merely stating a simple case of probability ? It is true that it seldom happens to any one person to have small-pox twice in his life ; but it also seldom happens to any one person to be burnt out, or to be shipwrecked, more than once in his life ; nevertheless, no one thinks it likely that there is any prophylactic power in having once passed through fire or shipwreck. It does not often occur that any one is attacked by the same kind of severe illness several times during his life. By far the greater number of persons may be said not to go through more than two or three severe illnesses in a life-time ; and it would be a remarkable occurrence if, considering the manifold and various predispositions to illness which during a whole lifetime may occur within a person, and in his surroundings, the *same* form of disease should be the result of two of these two or three instances. It must be allowed that probability is not in favour of this. But if the subject be considered from the point of view of probability (and as a general rule it is best to do this where a full certainty cannot be obtained), one is driven to a conception of inoculation and vaccination, against which there may be little to be said, but which is not to the advantage of either the one or the other of these pretended means of protection.

The probability of turning up a given number in a throwing of dice, is one-sixth, and the probability of turning up the same number twice, is one-thirty-

sixth. Let this (though without any reference to the absolute figures) represent the probability of getting small-pox twice in the natural course of things. Let us further suppose that we once *purposely* turn up the number in question, and that we afterwards throw the dice, then the probability of twice turning up the same number, one-sixth, will not be at all less than if we only threw the dice once; and this must represent the state of things when we purposely bring about the one state of small-pox. The probability of getting small-pox again is not at all diminishable thereby. If, therefore, any real importance is to be vindicated for inoculation and vaccination, it is necessary, whether there be positive reasons for doing [so or not, to believe that something really medicinally prophylactic resides in the imitated small-pox, as well as in the natural small-pox. It may be of interest to examine how the course of a small-pox epidemic ought to be judged of from the one or the other of these points of view.

In general there is required for the breaking out of a disease a combination of certain internal conditions (that is to say conditions belonging to the subject), and certain external conditions (outside of the subject), to which latter we may reckon in this case that which it is usual to call "contagious matter;" and the intensity of the disease is thus dependent upon the degree in which both these conditions are fulfilled. If a severe epidemic occurs, it must be supposed that the conditions in question are present

in considerable amount ; but as the disease proceeds and does its work, more and more of the elements disappear which were the cause of the resulting disease, the probability of the combination of the necessary conditions becomes less and less, and thus the epidemic must decrease till it totally disappears, in case new elements of disease are not gradually added. Looking at it in this way, it is easy to conceive how an epidemic may, be it during a longer or a shorter period, increase, decrease, and disappear, although we are perfectly ignorant of the physical causes which lead to the above-named conditions for the development of the disease. We believe that we are not mistaken in considering this view of epidemics in general as the most usual.

But with respect to small-pox in particular, there is a tendency to regard the matter, if not exclusively, yet essentially, in a very different way. It is said when a greater or a smaller number of persons are attacked by this disease, but escape with life, that these persons are "protected" against further attacks of the same disease ; and as gradually during the progress of the disease the number of individuals thus protected increases year by year, it is clear that the epidemic must decrease, working as it were to its own destruction. What reasons it is possible to adduce for this supposition, we do not know, because the fact stated above as to the rarity of small-pox attacking twice does not seem to us sufficient. If we had any special statistics bearing upon the re-

currence of disease (we do not know if there are any in existence), it would probably be shown that the proportion of recurrency would be quite unequal in different diseases ; but this would be all ; and perhaps it would be found that the proportion in respect of other diseases would not differ much from what it is in respect of small-pox. Perhaps there might be found some in which the proportion is still less than in the case of small-pox.

It is indeed exceedingly difficult to understand, that of two persons, A. and B., who are in precisely the same circumstances, if A. gets the small-pox, but B. not, then in the future A. will be protected against small-pox, but not B. He whose happy nature is strong enough to resist the first attack, must not be considered to have the same strength for resisting the second as he who gave way before, but did not succumb to the first attack ! But be this as it may, we are willing to leave aside a question as to which it is not easy on either side to find positive grounds and proof, and the more so as this question in reality has very little weight with regard to the principal object we have in view. Whether the decrease of small-pox during the pre-vaccination period be ascribed to the one or the other of the causes we have named, is quite indifferent. The chief thing is, that *without the aid of vaccination* the disease worked itself down, or was worked down, and that in all likelihood it would, even if vaccination had not intervened, have further worked itself down to the point it even-

tually reached ; just as now, as it seems, it is working itself up again, in spite of the supposed protection from vaccination. It is in the nature of the thing, that the epidemic once reduced to a minimum, should for some time remain almost unchanging ; but the small-pox epidemics of later years prove the incompetency of vaccination to keep it at the level to which it had been brought down. If from our point of view the question of the protective power of small-pox has any importance, it is only because we see in it the *πρωτον ψευδος* (the first false principle) which in the last resort has given rise to the incorrect ideas about the significance of inoculation and vaccination as a means of protection. Because, at the same time, the terror so easily explained of this horrible disease and of its sad consequences, even when the issue has been favourable, must naturally have induced a certain inclination to embrace any proposal that gave the least promise of protection. Whereas we, on our side, believe, that not until we have rejected all such kind of arcana as a means of protection, will science at last be able with full success to seek for, and also, we hope, to find, the true means of protection and the true remedies, so far as they are within the realm of possibility.

THE END.





